PLAN 2004

Boston Region MPO Transportation Plan 2004–2025

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BOSTON REGION MPO TRANSPORTATION PLAN 2004–2025

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Prepared by the Central Transportation Planning Staff for the Boston Metropolitan Planning Organization (MPO), which is composed of:

Executive Office of Transportation and Construction

City of Boston

City of Everett

City of Newton

City of Salem

Federal Highway Administration

Federal Transit Administration

Massachusetts Bay Transportation Authority

Massachusetts Bay Transportation Authority Advisory Board

Massachusetts Highway Department

Massachusetts Port Authority

Massachusetts Turnpike Authority

Metropolitan Area Planning Council

Regional Transportation Advisory Council

Town of Bedford

Town of Framingham

Town of Hopkinton

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CHAPTER 1: INTRODUCTION

Overview

The Regional Transportation Plan is the long-range, comprehensive transportation planning document for the Boston region. The region encompasses 101 cities and towns from Topsfield to Duxbury and Boston to Marlborough (see Figure 1-1). Its 1,405 square miles is about 18% of the state's land area, however, with over three million people, it includes 48% of the state's population.

The plan defines an overarching vision of the future, establishes goals and policies to achieve that vision, and allocates projected revenue to transportation programs and projects in order to implement those goals and policies. As such, the plan is fundamentally about making choices for the future of the metropolitan area—choices about local and regional land-use, choices about where to allocate our limited transportation resources, and choices about the type of future we wish to see for our region and, by extension, the commonwealth. In accordance with applicable federal planning regulations, the plan addresses surface transportation issues only.

The Plan's 22-year scope allows it to discuss the transportation network's future broadly. Only projects designated as regionally significant are specifically referenced in the Plan. The term "regionally significant" refers to projects required by federal regulations to be included in the travel demand model for air quality conformity purposes--generally any project that adds capacity to the regional transportation network. For a more detailed explanation of the types of projects that must be included in the model see Appendix I – Air Quality Conformity Determination

Most of the transportation programs and projects that will be funded in the next 22 years do not add capacity to the transportation system and are, therefore, not specifically identified in the Regional Transportation Plan. These projects are primarily operations and maintenance projects. Nevertheless, when it comes time to allocate funds for these projects in the Transportation Improvement Program they will be selected based upon how well they implement the goals and policies adopted in the Plan.

Figure 1-1
Metropolitan Planning Organization Region

The MPO Structure

The Boston Region Metropolitan Planning Organization (MPO) is the organization responsible for the development of the Transportation Plan. It conducts transportation planning for a large portion of eastern Massachusetts and for a variety of transportation modes and facilities. By bringing together representatives from local, regional, state, and federal entities and a public advisory committee, MPO decision-making occurs in an environment that is sensitive to the diverse range of interests and concerns that exist in the Boston region.

Federal law establishes requirements and guidelines for transportation planning in urbanized areas. In order to be eligible for federal transportation funding, an area must maintain a continuing, cooperative, and comprehensive (3C) transportation planning process. This process must result in plans and programs that are consistent with planning objectives for the metropolitan area. Section 134 of the Federal Aid Highway Act and Section 5303 of the Federal Transit Act, as amended, establish these planning requirements. The Boston Region MPO is responsible for carrying out the 3C process.

The Boston Region MPO is a cooperative board of 14 voting entities including:

- the Executive Office of Transportation and Construction (EOTC)
- the Massachusetts Bay Transportation Authority (MBTA)
- the Massachusetts Highway Department (MassHighway)
- the Massachusetts Turnpike Authority
- the Massachusetts Port Authority
- the Metropolitan Area Planning Council (MAPC)
- the Massachusetts Bay Transportation Authority Advisory Board
- the City of Boston and
- six elected municipalities from the Boston Region, currently:
    - City of Everett
    - City of Newton
    - City of Salem
    - Town of Bedford
    - Town of Framingham
    - Town of Hopkinton

The Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and the Regional Transportation Advisory Council also participate on the MPO in a non-voting capacity as advisory members.

Plan Development

The federal transportation planning regulation (23 CFR Part 450.322) requires the MPO to develop a regional transportation plan at least every three years. In addition, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) triennially review the planning process of each metropolitan planning organization. The Boston MPO adopted the 2000-2025 Transportation Plan in January 2001. Subsequently, on March 15, 2001, the two federal agencies submitted their report on the planning review of the MPO. The MPO planning process was recertified, subject to the completion of five corrective actions, which included the issuance of an updated Transportation Plan implementing improvements to the MPO's approach to environmental justice. Completion of this corrective action was required on or before March 15, 2002.

Updating the Transportation Plan also provided the Boston Region MPO with an opportunity to improve upon the work undertaken during the development of the 2000–2025 Plan. The Boston MPO underwent an extensive public outreach process to solicit additional public comments regarding the guiding policies of the plan, project selection, and environmental justice issues. The 2000-2025 Transportation Plan Update (Plan Update) was adopted by the Boston MPO on March 14, 2002, and submitted to FHWA and FTA. FHWA and FTA responded in May 2002, lauding the work accomplished by the MPO since the 2001 submission, but noted some continuing issues relating to environmental justice. They required the completion of two additional work products.

The first work product was an Addendum to the Plan Update, documenting conclusions from the Plan Update's environmental justice assessment and clearly relating those conclusions to the project selection process. The Addendum was adopted by the MPO and submitted to FHWA and FTA in September 2002. The second work product was the development of a work scope for a systems-level analysis of environmental justice issues, derived from effective practices employed by other MPOs. This work scope was also submitted to FHWA and FTA in September 2002. The tasks performed under this work scope have been completed to inform this iteration of the regional transportation plan. A full discussion of this process and the activities completed under the work scope is provided in Chapter 6 - Environmental Justice.

The 2004-2025 Regional Transportation Plan builds on the work performed over the past two years. The recently completed Plan Update included an extensive public outreach program soliciting input from the public in November 2001 (regarding guiding policies, land use policies and projects) and in February 2002 (on the draft plan). The MPO met regularly with the Regional Transportation

Advisory Council (the public advisory group to the MPO), the MPO's Environmental Justice Committee and the MAPC Subregions during the development of the Plan Update. In addition, the MPO received over 100 written comments from municipalities, elected officials, agencies, organizations, committees, and individuals, all of which were considered for inclusion in the Plan Update. The 2004 Plan includes a review of the projects included in the previous Plan, continued environmental justice efforts as outlined in the work scope developed in September 2002, a financial analysis, and an air quality conformity determination of the final set of projects.

Relationship to Other Planning Documents/Initiatives

The Boston MPO is required to develop other documents as part of the 3C Transportation Planning Process. These documents include:

- the Unified Planning Work Program
- the Congestion Management System and
- the Transportation Improvement Program.

A summary of these documents and their relationship with the Transportation Plan is provided below.

The Unified Planning Work Program

The annual Unified Planning Work Program (UPWP) describes transportation planning studies to be undertaken in the region during a given fiscal year. The UPWP is intended to serve two purposes. The first is to provide information to government officials, local communities, and the general public about transportation planning studies that are expected to occur in the Boston region. The second is to provide complete budget information to federal and state officials about the expenditure of federal funds for planning studies being carried out by the MPO.

Planning studies undertaken through the UPWP are an important source of ideas that may evolve into projects and eventually be included in the Transportation Plan. Likewise, ideas received during the public outreach process for the Plan may become studies undertaken in the UPWP.

The Congestion Management System

The purpose of the MPO's Congestion Management System (CMS) is to improve the mobility of residents and visitors in eastern Massachusetts. The CMS provides decision-makers with information about transportation system performance and with strategies to improve service. The CMS is a two-part process: a CMS report and CMS planning studies. The objectives of the CMS

report is to locate mobility concerns and identify what planning studies, if any may be undertaken to address them. The CMS report and associated planning studies, funded under the UPWP, help in the selection of projects for the Plan and the Transportation Improvement Program.

Transportation Improvement Program

The Transportation Improvement Program (TIP) is a multi-modal program of transportation projects that is consistent with the policies and goals of the Transportation Plan. The TIP describes and prioritizes transportation projects expected to be implemented during a three-year period. It contains a financial plan showing the revenue source or sources, current or proposed, for each project. In order to be eligible to receive federal funds, a project (highway or transit) must be programmed in the current fiscal year's TIP. Most highway projects funded with state transportation money are also included in the TIP in the Boston region. In addition, all regionally significant projects must be included in the Plan before they can be included in the TIP. One function of the TIP is to serve as a tool for monitoring progress in implementing the Plan.

Other documents or initiatives are also considered in the development of the Regional Transportation Plan. Among the most important are the MBTA's *Program for Mass Transportation* and various legal commitments that state transportation agencies and authorities have been obligated to undertake.

Program for Mass Transportation

The *Program for Mass Transportation* (PMT) is the long-range, twenty-five year capital program for the MBTA. The objective of the PMT is to identify and prioritize projects that will result in a cost-effective mass transit system that serves the greatest number of passengers while furthering environmental, economic development, and environmental justice goals. The MBTA adopted a new PMT in May 2003. The MPO used the PMT to prioritize transit projects for inclusion in the Regional Transportation Plan.

Legal Commitments

Several transportation projects are legal requirements that EOTC or another transportation agency must complete within a certain timeframe. The two categories of legal commitments that have the greatest impact on planning in the Boston region are the State Implementation Plan (SIP) and commitments related to the Central Artery.

The SIP is a requirement of the Clean Air Act for states with one or more regions that do not meet federal air quality standards. The SIP describes the efforts that a state has made or proposes to undertake or study to reduce levels of ozone and

carbon monoxide. In Massachusetts, EOTC and other transportation agencies are required to implement projects that are included in the SIP.

Central Artery commitments are the result of an agreement entered into by the Department of Environmental Protection (DEP) and EOTC during the approval process for the project. This agreement was recently reviewed and updated with revised implementation schedules in an Administrative Consent Order between DEP and EOTC.

As a matter of policy, the MPO includes all legal commitments related to the SIP and the Consent Order in the Regional Transportation Plan.

CHAPTER 2: THE BOSTON REGION

The Boston region consists of 101 cities and towns in Eastern Massachusetts encompassing approximately 1,405 square miles. The region roughly corresponds to a 20-mile radius from the City of Boston to the communities that abut Interstate 495. The Greater Boston area provides an urban setting rich in history and waterfront vistas. Inland, the region offers over 25 state forests and parks, as well as numerous freshwater rivers, lakes, and ponds. Forests make up 39% of the area, with water, wetlands, and open space contributing another 11%. The region is bordered on the east by approximately 550 miles of coastal waterfront and the Boston Harbor Islands National Park.

Population

According to the 2000 Census, the Boston region has a population of just over 3 million residents and contains approximately 1.2 million households, yielding a regional average of 2.47 persons per household. The 101 communities that comprise the region are quite diverse (see Table 2-1) ranging from the relatively rural community of Essex and the suburban community of Nahant to the urban centers of Boston and Cambridge. These communities and the persons who reside within their boundaries have different transportation needs requiring solutions uniquely designed to fit their diverse demographic, cultural and environmental situations.

Table 2-1
A Comparison of the Five Lowest Population Communities and the Five Highest Population Communities in the MPO Region

	Population	Households	Pop./HH	Square Miles	Pop./Sq.Mi.
Essex	3,267	1,313	2.49	14.28	229
Nahant	3,632	1,629	2.20	1.06	3,426
Bolton	4,148	1,424	2.91	20.12	206
Sherborn	4,200	1,423	2.95	16.14	260
Wenham	4,440	1,285	2.70	8.12	547
Boston	589,141	239,528	2.31	49.40	11,926
Cambridge	101,355	42,615	2.03	7.16	14,156
Lynn	89,050	33,511	2.62	11.45	7,777
Quincy	88,025	38,883	2.22	16.70	5,271
Newton	83,829	31,201	2.51	18.19	4,609
Regionwide	3,066,394	1,197,397	2.47	1,405	2,182

Employment

According to the 2000 Census, the Boston region employed 1,875,850 persons in 2000, a 52% increase in the number of jobs from 1970. The majority of these jobs are in the urban core of the MPO, with the cities of Boston and Cambridge continuing to be the primary employment centers. However, suburban job growth outpaced that of the urban core over the past 30 years as shown in Table 2-2.

Table 2-2
Employment Growth in the Boston MPO Region

Area	Employment		Change	% Change
	1970	2000		
Inside Route 128	685,100	891,850	+206,750	+30%
Outside Route 128	545,300	984,000	+438,700	+80%
Region	1,230,400	1,875,850	+645,450	+52%

The rate of job growth outpaced the population growth widening the gap between available jobs and the labor force needed to fill them. This led to some of the new jobs in the Boston region being taken by persons living outside the region. This trend is likely to continue and will require collaborative efforts among the metropolitan planning organizations of eastern Massachusetts, southern New Hampshire and Rhode Island.

Rapid expansion of employment in the last 25 years affected the transportation system in two major ways:

- The transportation system needed to become more extensive to cover increasing needs of under-served communities, and
- The transportation system usage became more concentrated during peak periods of commuting, putting increasing strain on the capacities of transportation facilities.

Land Use

Between 1991 and 1999, the share of developed land in the Boston region grew by 2.5 percent, which averages out to about 7.6 acres a day. The majority of the new land consumption was for single-family housing. Most of this development took place on former agricultural and forested lands. Table 2-3 shows the changes in land use in the region between 1991 and 1999. The majority of land being developed for residential, industrial and commercial uses was located along the Route 128 and I-495 corridors.

Table 2-3
Changes in Land Use (1991-1999)

Land Use	1991 (sq. mi.)	1999 (sq. mi.)	Change
Residential	471	503	+7%
Commercial	40	42	+3%
Industrial	36	38	+6%
Open Space	80	79	-1%
Forests	558	536	-4%
Crop Land/Pasture	54	47	-2%

Source: Resource Mapping Project at the University of Massachusetts, Amherst

Although land use is controlled at the local level, a number of growth initiatives have been implemented at the state level. The Executive Office of Environmental Affairs (EOEA) provided funds for buildout analyses of all communities in Massachusetts. This analysis allows communities to see what would happen if the remaining undeveloped land was developed in accordance with current local zoning. This allows communities to consider and ask questions about future development.

Other growth planning guidelines implemented by the Commonwealth include:

- The Massachusetts Environmental Policy Act of 1977 requires all agencies of the Commonwealth to determine the impact on the natural environment of all works, projects, or activities conducted by them and use all practicable means and measures to avoid or minimize identified environmental harm.

- An Executive Order on Planning for Growth was issued by the Governor in April 1996. It declared the Commonwealth should actively promote sustainable development in the form of (a) economic activity and growth supported by adequate infrastructure without sacrificing environmental quality and resources and (b) infrastructure development designed to minimize adverse environmental impacts from economic activity. EOEA established the buildout analysis under this program.

- Executive Order 418 works from the buildout analyses by directing EOEA, the Department of Housing and Community Development, and EOTC to provide funds to assist the communities in planning for housing, open space, economic development and historic preservation.

- The Community Preservation Act enables communities to establish a municipal Community Preservation Fund by local referendum. The Fund is collected as a surcharge on local property taxes (up to 3%) with matching state funds. Monies can be used for open space, historic preservation and moderate-income housing. As of May 2003, 25 of the 101 communities of the Boston MPO region had created Community Preservation Funds.

- Areas of Critical Environmental Concern, identified by EOEA contain concentrations of highly significant environmental resources. Any transportation project constructed in or around an Area of Critical Environmental Concern must follow regulations to alleviate negative impacts.

In addition, MAPC coordinates a Concentrated Development Centers (CDC) program in the Boston region. CDCs are areas designated to encourage high-density development near existing public facilities such as transportation, sewer, water, parks and recreation. Transit-oriented development provides an opportunity to link transportation and land use during the development phase.

As mentioned earlier, land use is primarily controlled at the municipal level, while transportation policy is promulgated at the regional and state levels. The Boston Region MPO, as a regional transportation forum, attempts to promote a consensus-building process by which limited federal transportation funds may be allocated to the most needed and regionally significant projects.

EXISTING TRANSPORTATION SYSTEM

The transportation system within the Boston Region MPO is an extensive collection of roads, transit, bicycle, pedestrian, and ferry routes that work as an integrated system throughout the 101-community MPO region and beyond. The following sections describe each mode as they exist today.

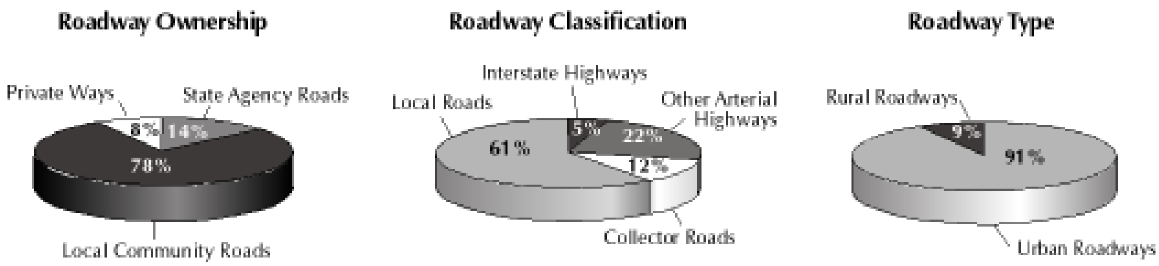
The Roadway System

Roadways

The region's roadway system is comprised of interstate highways, other arterial highways, collector roads, local roads, and bridges. There are 23,233 lane miles in the region. Regionwide, there are 6,296 miles of arterials, including 1,148 miles of interstate; 2,811 miles of collector roads; and 14,126 miles of local roads. Arterials (which include interstates, freeways and expressways) provide a high level of mobility at a relatively fast speed for long uninterrupted distances with limited access at specific locations. Collector roads provide a lower level of

mobility than arterials at lower speeds, with shorter distances between access points. Collector roads connect local roads with arterials and provide access to abutting land uses. Local roads provide a high level of access to abutting land but limit mobility. Ownership and maintenance responsibilities for these roadways vary among local, state and federal entities. The roadway classification, however, does not correlate to ownership. Roads and streets are grouped into functional systems according to the types of service they provide. Figure 2-1 shows a breakdown of roadway ownership, classification, and type of roadways in the Boston region.

Figure 2-1
Breakdown of Roadway Ownership, Classification, and Type



The largest and most complex roadway project in United States history, the Central Artery/Tunnel (CA/T) project, is located in the Boston Region and is under the control of the Massachusetts Turnpike Authority. The project includes a number of major segments that will improve mobility in the highly congested downtown Boston area. The project is scheduled for completion in April 2005.

MassHighway has recently formed a task force that examines how highway projects impact historic and rural areas. The goal of the task force is to improve the way in which MassHighway designs, constructs, and reviews projects in these sensitive areas. In response to these concerns about the impacts of the state's roadways on the communities they traverse, the Governor has announced a "Communities First" initiative. An advisory committee is to review and revise the state's highway design manual. MassHighway will work closely with communities as policy implementation of this initiative continues.

Bridges
There are 1,516 bridges in the MPO region. MassHighway's statewide bridge management system classifies each bridge in the state into one of three categories:

1. The bridge meets standards

2. Functionally obsolete – fails to meet current traffic demands or highway standards such as bridge width, traffic volume, or condition.
3. Structurally deficient – deterioration has reduced load carrying capacity and is an indication that reconstruction is, or may be, necessary.

Safety

Massachusetts has one of the lowest highway fatality rates in the nation, with rates for fatalities per licensed driver and fatalities per registered vehicle approximately half of the national rates. One contributing factor is the effort the Commonwealth makes to identify and correct high accident locations. The state annually assesses crash data to determine which intersections might be candidates for remedial measures. MassHighway tracks crash locations as reported in state and local police reports, and operator's accident reports. Table 2-4 shows the top twenty-five high accident locations within the MPO, along with the projects currently in the design or construction phase to correct the associated traffic safety issues.

Congestion

There are two types of congestion that affect the region's highway network, mostly during the peak periods of travel: recurring congestion and non-recurring congestion. In most cases, recurring highway congestion is caused by insufficient capacity at highway segments (i.e., too few traffic lanes, lack of lane continuity, etc.) and traffic flow turbulence at locations where vehicles merge, diverge, and weave across lanes to change direction (i.e., interchanges, access and egress points). Non-recurring congestion is due to crashes and other traffic incidents (e.g., disabled vehicles) that impede mobility, and cause delays and frustration to all drivers.

Programs to Improve Mobility in the Region

Currently there are a number of programs being implemented to improve roadway mobility. A brief summary of these programs is provided below.

<u>Congestion Management System</u>

The MPO maintains a Congestion Management System (CMS) that identifies mobility problems and possible solutions. This system can be used by decision makers for project planning, priority setting, and programming. The CMS is a two-part sequential process that consists of a CMS report and CMS planning studies. The report identifies problems and the planning studies recommend improvements that are considered in the development of the Transportation Plan and TIP. Problems of mobility are also identified by the ongoing CMS monitoring program, planning studies, and public comments.

Table 2-4

Top 25 Crash Locations in the MAPC Region 1997-1999

	City / Town	Route number	Street	Intersecting Route	Intersecting Street	Total Crashes	Weighted Average	Relevant Project and Status
1	READING	I-95	YANKEE DIVISION HIGHWAY	I-93	INTERSTATE 93	678	1618	MassHIgway Planning Study underway
2	REVERE	1	CUTLER HIGHWAY	60	ROBERT M COPELAND CIRCLE	466	1335	Part of Rte. 1 realignment future EIR
3	SOMERVILLE	38	MYSTIC AVENUE	I-93	INTERSTATE 93	415	1152	FY 2003 TIP, Supplemental List, #600831
4	BOSTON	I-90	MASSACHUSETTS TURNPIKE	I-93	JOHN F FITZGERALD EXPRESSWAY	461	1029	Under Construction (Central Artery)
5	SAUGUS	1	BLUE STAR MEMORIAL HIGHWAY	129	WALNUT STREET	350	958	FY 2003 TIP Project, # 601513
6	BOSTON	3	LEVERETT CIRCLE	3	LEVERETT CIRCLE	393	894	Under Construction (Central Artery)
7	BRAINTREE	37	GRANITE STREET	I-93	INTERSTATE 93	313	845	FY 2003 TIP, Supplemental List #603134
8	MEDFORD	16	MYSTIC VALLEY PARKWAY	28	FELLSWAY	343	815	
9	DANVERS	1	NEWBURY STREET	114	ANDOVER STREET	316	792	FY 2003 TIP, Supplemental List # 600921
10	CANTON	I-95	YANKEE DIVISION HIGHWAY	I-95	INTERSTATE 95	295	779	MassHighway's EIR is scheduled to begin in 2003
11	WOBURN	I-95	YANKEE DIVISION HIGHWAY		WASHINGTON STREET	301	769	Part of MassHighway I-93/I-95 Planning Study
12	WALTHAM	I-95	YANKEE DIVISION HIGHWAY		WINTER STREET	368	768	MassHighway Planing Study underway
13	MEDFORD	16	CONNECTOR MYSTIC VALLEY PARKWAY	I-93	INTERSTATE 93	295	727	
14	REVERE	1A	BELL CIRCLE	1A	BELL CIRCLE	243	695	MassHighway EIR underway
15	WESTON	I-90	MASSACHUSETTS TURNPIKE	I-95	YANKEE DIVISION HIGHWAY	378	686	
16	BURLINGTON		MIDDLESEX TURNPIKE	I-95	YANKEE DIVISION HIGHWAY	280	685	
17	BOSTON	I-93	GENERAL CASIMIR PULASKI SKYWAY		MASSACHUSETTS AVENUE	263	675	Under Construction (Central Artery)
18	QUINCY		FURNACE BROOK ROTARY	I-93	INTERSTATE 93	236	668	
19	WOBURN		MONTVALE AVENUE	I-93	INTERSTATE 93	261	657	
20	BOSTON	1	TEMPORARY RAMP	I-93	INTERSTATE 93	246	618	Under Construction (Central Artery)
21	WEYMOUTH	18	MAIN STREET	3	PILGRIM HIGHWAY	232	616	FY 2003 TIP Project, Design and Permitting Work
22	BOSTON		CHARLES CIRCLE	28	EMBANKMENT ROAD	279	615	
23	BOSTON	I-93	DEWEY SQUARE TUNNEL	I-93	JOHN F FITZGERALD EXPRESSWAY	254	610	Under Construction (Central Artery)
24	SAUGUS		MAIN STREET	1	BLUE STAR MEMORIAL HIGHWAY	206	610	
25	SAUGUS		ESSEX STREET	1	BLUE STAR MEMORIAL HIGHWAY	205	601	

Recommendations and projects that are implemented from the CMS program include the following:

Freeways and Highways

- Measures to reduce recurring congestion along highway segments include correction of existing inconsistencies in travel-lane continuity and increasing the person-throughput of the highway by the maintenance and monitoring of high occupancy vehicle facilities.
- Delay and safety improvement at interchanges require the redesign and construction of on- and off-ramps that are currently substandard, rebuilding of ramps and entire interchanges, or construction of new interchanges as necessary.
- Non-recurring congestion requires effective incident management involving the detection, verification, response, and removal of highway incidents. Incident management is the coordinated, pre-planned use of human and technological resources to restore full capacity after an incident occurs, and the provision of information to motorists until the incident is cleared. Key functions for a successful incident management program include traffic surveillance, traffic operations centers, traveler information, and other supportive Intelligent Transportation System (ITS) programs and services. Incident Management exists in the Boston Region MPO region and is operated by MassHighway in coordination with other state agencies with emergency response responsibilities.

Arterials and Collector Roads

- Boston and the Inner Suburbs
    - Strict enforcement of existing parking regulations
    - Operational improvements and traffic management strategies including signal upgrade and coordination programs, adaptive control traffic signal priority systems, pedestrian signals, and access management programs
    - Traffic signal priority for transit
- Outer Suburbs
    - Downtown parking management and traffic circulation
    - Traffic signal coordination
    - Left turn bypass opportunities at unsignalized locations
    - Intersection and traffic signal upgrades
    - Pedestrian sidewalks and crosswalks

- Access management

A more detailed discussion of the Boston MPO's congestion management strategy is included in Appendix A.

Measures to Increase Automobile Occupancies and Efficiencies
The member agencies of the Boston Region MPO have provided numerous alternative driving options. Measures that increase vehicle occupancy, help in relieving congestion, or allow for a more efficient use of the roadway network fall under the broad categories of Transportation Demand Management (TDM) and Intelligent Transportation Systems (ITS). TDM measures involve a wide range of strategies such as promoting ride-sharing, allowing for flextime or alternative work schedules, or subsidizing the cost of non-single occupancy vehicle travel. Congestion can be reduced not only by removing vehicles from the roadway, but also by getting them through toll booths more efficiently, and by letting drivers know of congestion so they can plan alternative routes or times for travel. Existing programs are described below:

Intelligent Transportation Systems (ITS)
Intelligent Transportation Systems involve the integration of technology to manage the operation of transportation facilities. The Boston Region MPO has participated in the development of ITS activities since 1992. Boston was one of the first cities to complete an FHWA-sponsored metropolitan area Early Deployment Plan for ITS in 1993.

MassHighway is currently developing an ITS architecture for Metropolitan Boston. The final product will conform to the National ITS Architecture as required by section 5206(e) of the 1998 Transportation Equity Act for the 21st Century (TEA-21). The intent of this work is to help transportation agencies eliminate duplication; reduce design costs and project development time; facilitate efficient system expansion; improve safety and security; facilitiate deployment of new technologies; and lower system life cycle costs.

MassHighway, Massachusetts Turnpike Authority, Massachusetts Port Authority, and the City of Boston currently monitor road conditions and traffic flow on major highways and intersections using fixed equipment such as loop detectors and wireless communications. The Massachusetts Turnpike CA/T Operations Control Center is the largest of its kind, featuring over 400 cameras to monitor roads; 1,200 road sensors to detect stopped traffic; 120 carbon monoxide sensors; computer-controlled ventilation buildings; and a radio frequency able to interrupt radio broadcasts and dispatch emergency information. MassHighway and Masspike operate numerous variable message signs. The MassHighway

Regional Operations Center dispatches emergency locator HELP patrol vans. Automatic Vehicle Locator (AVL) capability is planned.

FAST LANE is an electronic toll collection system instituted along the Massachusetts Turnpike in October 1998. Vehicles in the FAST LANE system are equipped with transponders that signal a vehicle is going through a toll plaza without the vehicle having to stop. The toll cost is automatically deducted from a pre-established account. FAST LANE is in operation on the Massachusetts Turnpike, at the Ted Williams Tunnel, the Sumner/Callahan Tunnels, the Tobin Bridge, and is interoperable with EZPass, the electronic toll system used in New York, New Jersey, Delaware, Pennsylvania, West Virginia, and Maryland.

SmarTraveler®, sponsored by MassHighway and operated by SmartRoute Systems, delivers real-time, location-specific traffic and transit information for Metropolitan Boston via a touch-tone phone (617-374-1234) free of charge. Traveler information is also disseminated through on-line services, television, radio, and print media. Traffic and transit surveillance consists of cameras at strategic locations; "mobile probes" reporting to the operations center by mobile phone or two-way radio; monitoring of 350 publicly available radio frequencies for emergency vehicles; and direct lines to the State Police, Amtrak, MassHighway, and the MBTA.

CARAVAN

CARAVAN provides assistance to commuters, companies, and Transportation Management Associations throughout the Commonwealth. It is a private, nonprofit organization that receives funding from MassHighway and the Federal Highway Administration. CARAVAN's 1-888-4-COMMUTE toll-free information line and www.commute.com provide information from over 50 public and private transportation providers statewide. CARAVAN also operates RideSource, a comprehensive commute management system.

The Transit System

The public transportation network plays a vital role in providing mobility for residents and visitors who prefer not to or are unable to drive; sustaining a high quality of life and environment; and fueling regional economic growth. The Boston metropolitan area is served by a hub-and-spoke network of rapid transit, streetcar, express bus, commuter rail, and commuter boat lines. These services provide high quality, cost-effective commuting alternatives to the single-occupant automobile. Local bus and trackless trolley services fill in the gaps between spokes by offering line-haul service in heavily congested areas, feeder

services to rail, and inter-suburban linkages. Demand-response transportation for people with disabilities and the elderly is also provided.

The MBTA is the primary transit provider in the Boston region. The MBTA district is made up of 175 communities and includes communities outside of the Boston Region MPO. A brief description of their services is described below. For a more detailed description of the MBTA's existing services see the *Program for Mass Transportation* adopted in May 2003 by the MBTA Advisory Board (www.bostonmpo.org/bostonmpo/pmt).

Rapid Transit and Streetcar

The MBTA rapid transit and streetcar system serves 134 stations on six lines. Daily ridership on the rapid transit/streetcar system is approximately 699,000 trips per weekday.

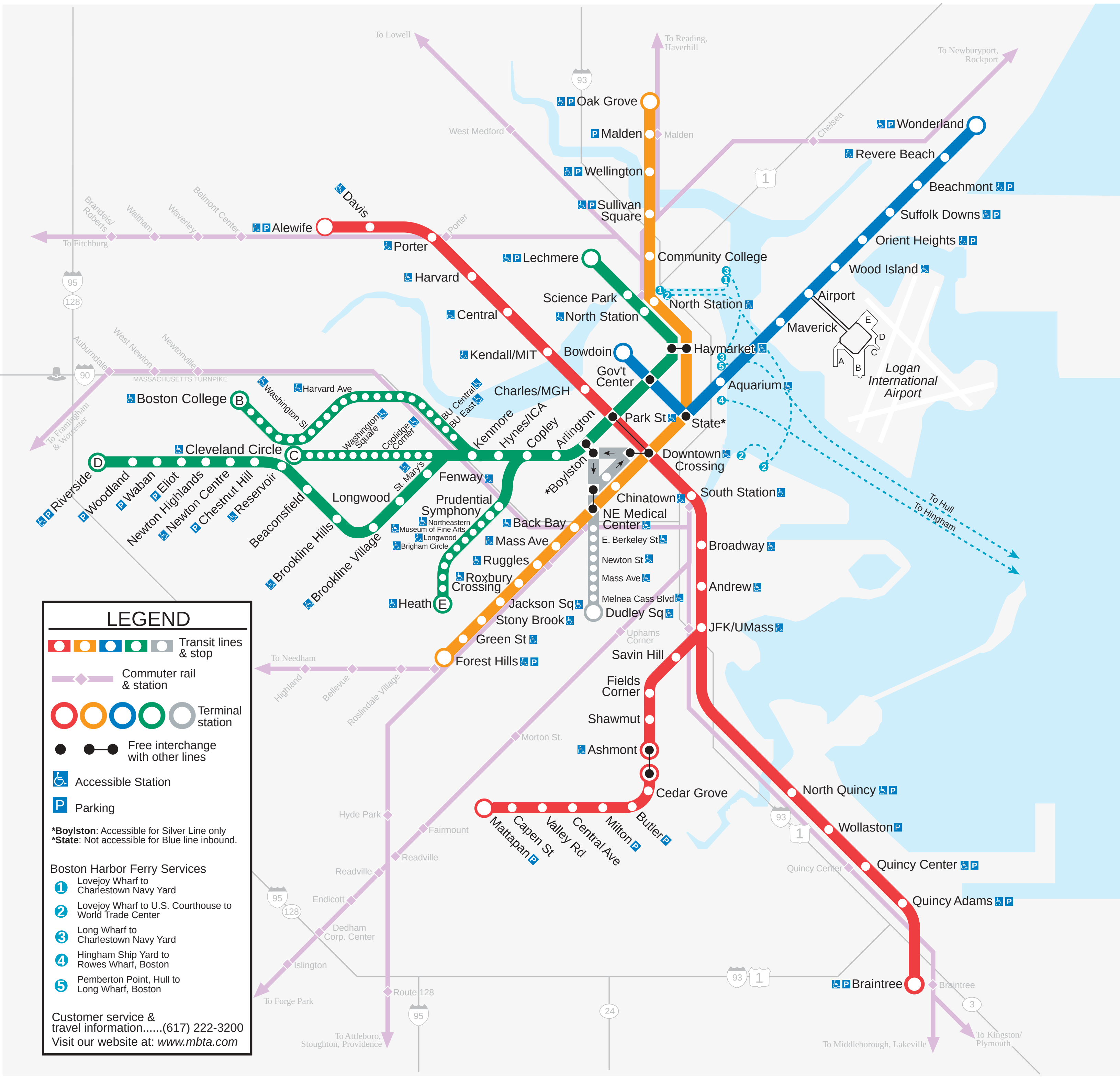
- Red Line – 21-mile line running on two branches between Alewife Station in North Cambridge to both Ashmont Station in Dorchester and Braintree Station in Braintree. It is the longest and most heavily utilized rapid transit line in the system.
- Mattapan High Speed Line – connects with the Red Line and operates between Ashmont Station and Mattapan through the Dorchester neighborhood of Boston and the town of Milton.
- Orange Line – 11-mile line operates between Oak Grove on the Malden/Melrose line and Forest Hills in Jamaica Plain.
- Blue Line – 6-mile line, the shortest of the rapid transit lines, operates between Wonderland Station in Revere and Bowdoin Station in the Government Center area of Boston.
- Green Line – 23-miles of track over four streetcar branches in Cambridge, Boston, Brookline, and Newton: Boston College branch (B Line), Cleveland Circle branch (C Line), Highland branch (D Line), and the Heath Street branch (E Line).
- Silver Line – a 2-mile bus rapid transit line operating along Washington Street between Dudley Square in Roxbury to Downtown Crossing in Boston.

Figure 2-2 shows the rapid transit and streetcar service in the Boston region.

Bus and Trackless Trolley

The MBTA operates 170 bus routes plus four electric trackless-trolley lines in Cambridge, Watertown and Belmont. Total bus and trackless trolley ridership was approximately 376,000 trips per weekday and nearly all routes connect with the rapid transit system. Bus service is provided via crosstown service, feeder service to rapid transit stations, line haul service in heavily congested areas, and

FIGURE 2-2
MBTA Rapid Transit System



express bus. Most of these routes have lengthy histories, and many had their origins as streetcar lines built before 1900. Schedules and routings have been revised gradually over the years, but most continue to operate along the same general alignments in response to continuing demand.

Commuter Rail

The 365-mile commuter rail network is comprised of 13 radial lines with a weekday ridership of over 142,000 (see Figure 2-3). The commuter rail system is split into two sides: northside service operates to and from North Station, and southside service to and from South Station. The Massachusetts Turnpike can be considered the dividing line between North and South Station service: all routes north of the Turnpike – the Rockport, Newburyport, Haverhill, Lowell, and Fitchburg lines – operate to and from North Station. Lines along the Massachusetts Turnpike or to the south – the Framingam/Worcester, Needham, Franklin, Attleboro/Providence, Stoughton, Fairmount, Middleborough, and Kingston/Plymouth lines – operate to and from South Station. Over 30,000 park and ride spaces are provided for commuter rail riders.

Commuter Boat

MBTA commuter boat service operates between:

- Hingham and Rowes Wharf (Boston)
- Hull and Long Wharf (Boston)
- Charlestown Navy Yard and Long Wharf
- Lovejoy Wharf to World Trade Center via the John Joseph Moakley Federal Courthouse (Boston)
- Charlestown Navy Yard and Lovejoy Wharf (Boston)

A total of 1,815 parking spaces are provided in Hingham and Hull. The total annual ridership is 1.4 million passengers.

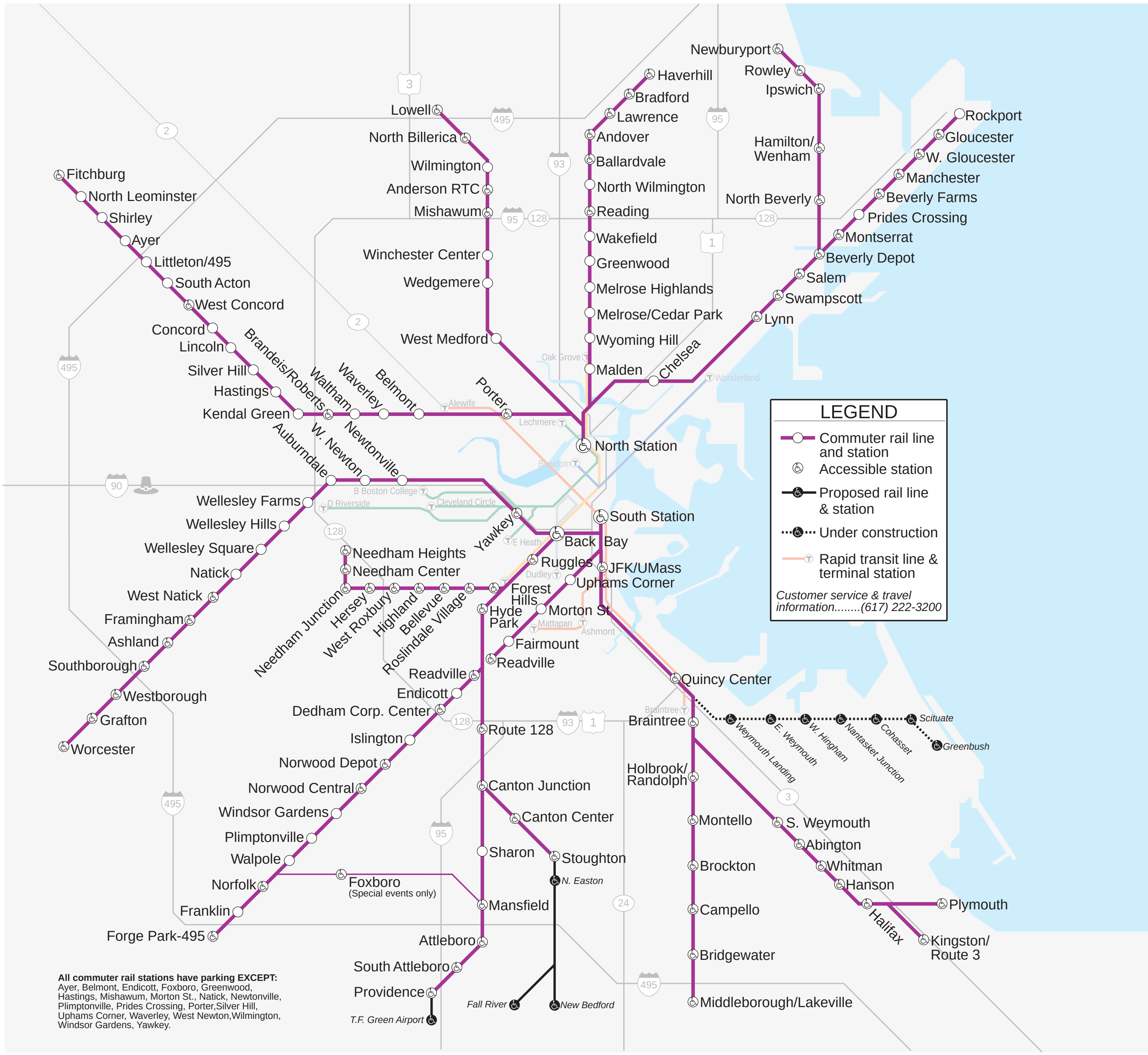
Paratransit

The RIDE service is a paratransit program operated by private carriers under contract to the MBTA that provides transportation to people who cannot use fixed-route public transportation because of disabilities. The RIDE operates sedans and lift-equipped vans within 62 municipalities in the MBTA district.

Private Carrier and Suburban Bus Service

Five private carriers provide regular local bus transportation in East Boston, Winthrop, Peabody, Salem, Medford, Milton, Canton, Hingham, and Hull under contract to the MBTA. Nine additional private carriers are subsidized through the MBTA's Inter-District Transportation Program (ITP) to provide commuter service to Downtown Boston. The same program also finances local services from Framingham to surrounding towns and from Braintree Station to Hanover,

FIGURE 2-3
Commuter Rail System



Marshfield, and Plymouth. Nine private carriers that are not included in the ITP program also operate commuter service into Boston.

The MBTA provides funding to local communities to operate their own local transit systems. The Suburban Bus Program is geared toward low-density communities where regular MBTA service would not be cost-effective. The program began in 1979 and subsidizes 11 communities. Four communities – Newton, Concord, Waltham, and Peabody operate local bus services, not included in the Suburban Bus Program.

Programs to Improve Mobility in the Region

Intelligent Transportation Systems (ITS)

The MBTA employs ITS strategies that are included as part of the ITS architecture for Metropolitan Boston. A new bus operations center was recently added to the MBTA's existing rapid transit operations facility. This center will integrate global positioning systems (GPS) on its buses to better schedule and direct its fleet. The Silver Line buses are equipped with GPS-based Automatic Vehicle Location (AVL) technology. The MBTA is also planning to install equipment that will allow some transit vehicles to request signal priority through short-range communication directly with roadside traffic control equipment.

New fare collection equipment is on order for subways and buses. Both magnetic-strip fare media and "smart cards" will be used. Future expansion of the fare collection equipment is planned for commuter rail and parking. This equipment can have the capacity to collect data and determine accurate ridership levels, thereby allowing the implementation of variable and flexible fare structures.

The MBTA provides traveler information services in a variety of ways. Customers can access schedules and maps, and fare, station, and parking information for all bus, rail, and boat service on the MBTA's Web site. New automatic trip planning functions are likely to be added to the Web site in the future. Kiosks at bus stops on Washington Street in Boston inform passengers about Silver Line bus arrivals. Interactive travel information kiosks at the South Station Transportation Center provide a direct link to the MBTA's Web site where customers can access schedule information for all services. Information is also provided through electronic boards on commuter rail platforms.

The MBTA is planning to provide an enhanced customer service information system that will tie directly to the software now being used by the scheduling department. This system will allow customers to access next-trip information for all routes over the phone or on the MBTA's Web site. An itinerary-planning tool

will also be available to customers on the Web, generating origin-destination routing suggestions without the aid of a customer service agent.

Park and Ride Facilities

There are 117 park and ride facilities within the Boston region. These facilities play an important role in reducing congestion in Boston's urban core by enabling individuals to drive short distances from their homes and gain access to other forms of transportation, such as commuter buses, carpools, vanpools, rapid transit, and commuter rail. Most of the lots are conveniently located in downtown centers or along major highways (see Figure 2-4). The MBTA is the largest provider of commuter parking spaces. MassHighway, Massport, and the Massachusetts Turnpike Authority also operate park and ride facilities.

There are 76 commuter rail stations within the Boston Region that have parking facilities. 53 of these facilities were monitored as part of 2002 CMS Park and Ride Lot Utilization monitoring efforts, and 85% were considered to be at capacity. Another 29 park and ride lots are located at MBTA rapid transit stations. 68% of these parking facilities are considered to be at capacity. The remaining facilities are Logan Express lots (which operate out of Braintree, Framingham and Woburn to Logan Airport), MBTA-contracted ferry depots, or private bus and van lots.

Many of the park and ride lots that are at capacity fill very early in the morning. Many commuters may shift travel schedules and work hours to arrive at these facilities early enough to secure a parking space. Limited parking results not only in commuters being forced to drive into Boston when they find a station to be full, but also some may forego transit altogether due to the uncertain availability of parking.

Key Station Program

The Americans with Disabilities Act (ADA) mandated improvements to facilities and infrastructure to ensure that they are accessible. The MBTA developed the Key Station Program, which designated 80 Stations in the MBTA system to be brought into compliance with ADA. Currently 57 stations are in compliance, with the remaining stations to be completed by 2011.

Transportation Management Associations

Transportation Management Associations (TMAs) are non-profit coalitions of local businesses dedicated to reducing traffic congestion and pollution and improving commuting options for their employees. Several TMAs support shuttle services which connect employment locations with MBTA rapid transit or commuter rail stations. While some of these services are only available to

FIGURE 2-4
Park-and-Ride Lots

employees of the member companies, others are open to the general public.

Suburban Transit Opportunities

Where feasible, in areas of the region that are either not served or underserved by existing transit, the MPO has implemented a program to fund suburban mobility projects. The program will fund equipment and other capital-related expenses associated with services that aim to improve mobility in suburban areas. This program seeks to help capitalize services such as:

- fixed-route transit services operating in suburban-to-suburban and reverse-commute markets,
- employer-based van/carpools, and
- flexible-route transit services.

Eligible applicants include local or regional public entities, Transportation Management Associations, and other appropriate non-profit organizations capable of implementing transit services.

Currently, the MPO is studying how existing local suburban entities plan routes and operate services. A literature review of best practices in other metropolitan areas is also being conducted. This study is intended to provide the MPO and other stakeholders with both qualitative and quantitative indicators of what makes a suburban transit system successful.

Bicycle Access

Recently, the MBTA has enhanced its "Bikes-on-the-T" Program. The MBTA has worked on numerous aspects of the program to expand accessibility to the system for bicyclists, including elimination of the MBTA bicycle permit program. Bicyclists are allowed on commuter rail trains, and the Orange, Red, and Blue Lines on off-peak hours.

Reverse Commuting

The largest reverse commuting attractions for Boston residents are, and will likely continue to be, those within about 15 miles of downtown Boston. In 2001, the Central Transportation Planning Staff (CTPS) conducted a Reverse Commuting Study for the MBTA. The study examined the feasibility of providing additional commuter rail and connecting bus transportation services to facilitate reverse commuting. Most employment centers on Route 128 and I-495 are not serviced directly by commuter rail and few stations now have feeder bus configurations from existing stations. However, the study did identify opportunities for pilot programs that warrant further exploration.

Service Evaluation Process
MBTA Operations is constantly monitoring service and trying to change or adjust it according to customer demand. The MBTA considers a number of factors including the number of new transit riders, the rationale for the change, and the net cost per new passenger. Requests for new or changed services can be made by anyone—private citizens, elected officials, MBTA employees, or those representing neighborhood groups or business organizations.

Bicycle/Pedestrian

Bicycling and walking are primary modes of transportation for many residents within the Boston Region MPO. Much of the planning for bicycles and pedestrians is done at the local level. When planning is done at the regional level, pedestrian mobility is determined by the availability of sidewalks, their condition, and their safety and convenience to roadway crossings. Bicycle mobility is affected primarily by road conditions, although some off-road trails are available in the region.

Trails/Routes
There are eleven bicycle trails in the Boston Region MPO: the Minuteman Commuter Bike Path, Linear Park, the East Boston Greenway, the Dr. Paul Dudley White Bike Path, the Charles River Greenway, Marblehead Rail Trail, the Battle Road Trail, the Neponset River Trail (under construction), the Muddy River Path, the Jamaica Pond Path, and the Southwest Corridor Trail (see Figure 2-5). Most trails are built on abandoned railroad rights-of-way or along natural corridors such as rivers. The Minuteman Commuter Bike Path is an example of the former, and the Dr. Paul Dudley White Bike Path is an example of the latter.

One bicycle route exists in the Boston Region MPO and continues outside the region to Falmouth and Provincetown on Cape Cod. The Claire Saltonstall Bikeway, also known as Bikeway Route 1, is primarily an on-road signed route, with trail segments included where possible. It measures 135 miles in length.

Trails allow users to be separated from motor-vehicle traffic. Trails are used not only by experienced commuter bicyclists heading to work, but by novice adults and children, who, by using trails, might gain the confidence and experience necessary to travel on-road. In general, trails have proven to be very popular with a wide range of people.

Regional trails in the Boston area either in the planning stage or under construction include the following (see Figure 2-5):

- Bike-to-the-Sea (on the Saugus branch, from Lynn to Everett)
- Tri-Town Bikeway (Winchester, Woburn, and Stoneham)
- Border to Boston (Newburyport branch and Eastern Route main line; Danvers to New Hampshire)
- Assabet River Rail Trail (Marlborough branch, to South Acton)
- Central Massachusetts (Berlin to Belmont, called the Wayside Trail)
- Lowell-Sudbury (and possibly south to Framingham; northern part is the Bruce Freedman Trail)
- Upper Charles (Framingham to Milford)
- Minuteman-Charles River connector (via the Watertown branch)
- Peabody Bikeway
- Swampscott Rail Trail
- Rockland-Hanover Trail
- Minuteman Extension into Concord
- South Bay Harbor Trail
- Somerville Community Path Extension
- Mystic River Path

While the Boston area has a significant network of trails, these can serve only a fraction of all trips.

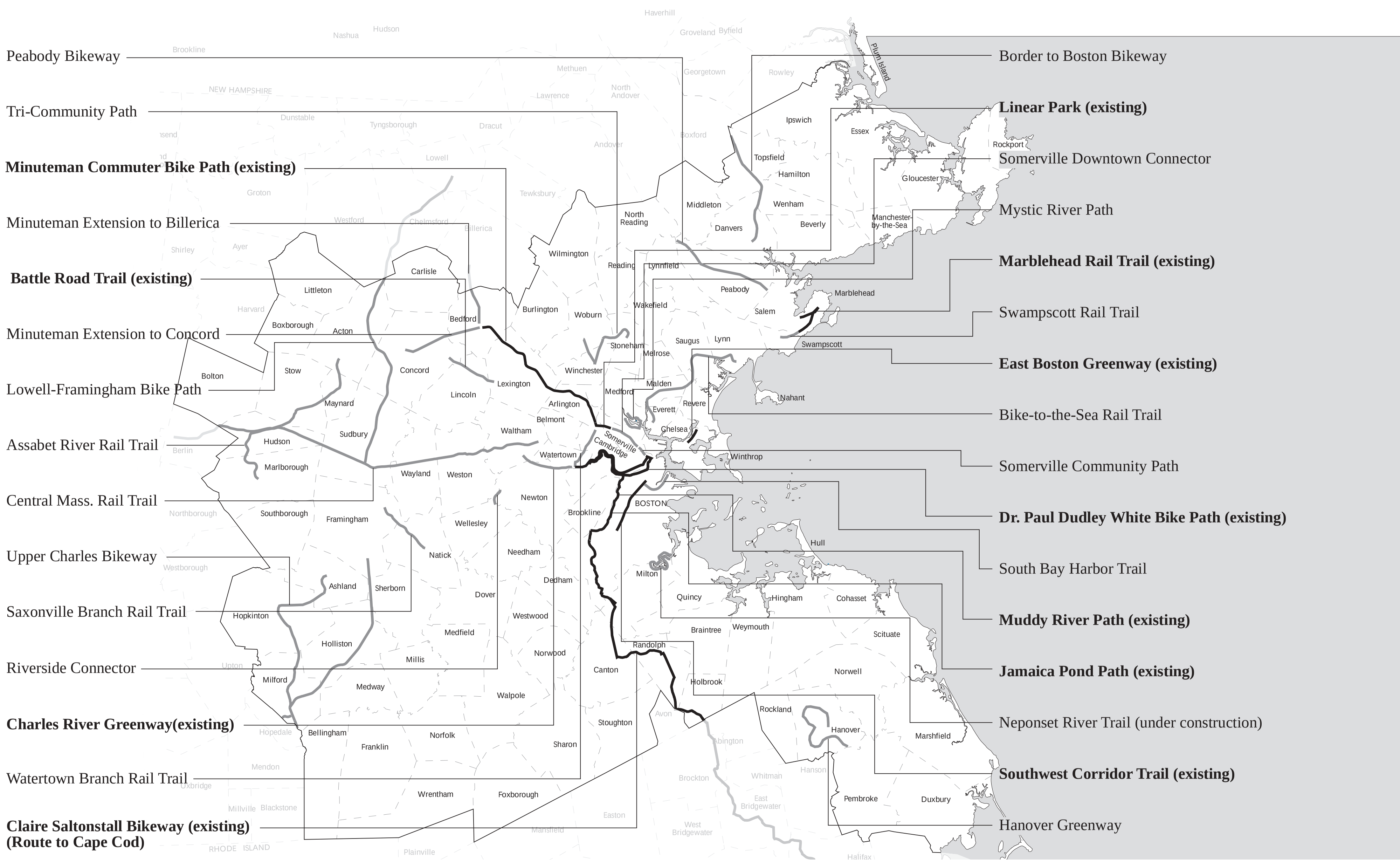
The MBTA has indicated that it will make rights-of-way available to communities for trails, either on a permanent or interim basis, depending on the future use of the land. There is also potential for trails alongside active rights-of-way when appropriate safety measures are used. Further examination of this option would be required.

MassHighway is responsible for funding both on and off-road improvements to make bicycle travel more attractive. They have teamed with the Massachusetts Office of Travel and Tourism to develop maps and brochures geared to bicycle travel. Improving bicycling requires accommodation of bicyclists on bridges and roadways, improving bicycle access to and parking at transit stations and park-and-ride lots, and promoting awareness of rights and responsibilities through education programs. While MassHighway's primary focus is planning and engineering, they continue to work closely with other agencies to enhance pedestrian and bicycle education, enforcement, and encouragement initiatives.

Road Travel

Chapter 90E, Section 2A, of the General Laws (Chapter 87, Acts of 1996) requires consideration of bicycle and pedestrian needs whenever feasible. The intent of this law is to make it as safe as practical for bicyclists and pedestrians. In some cases, re-striping may be all that is necessary, but room for bicyclists can be provided by bicycle lanes, paved shoulders, or by wide outside travel lanes.

FIGURE 2-5
Existing and Proposed Bicycle Facilities



Massachusetts state law regulates that bicycles operate under the same laws and adhere to the same regulations as motor vehicles. The most common on-road mobility constraint for bicyclists is lack of operating space. Pavement problems including potholes, pavement deterioration, and abrupt drop-offs at the edge of pavements, are much more critical to bicyclists than motorists. Recently, the Boston Region MPO completed the MetroWest Bicycle Compatibility Index which rates roads in the MetroWest subregion using the FHWA's index of bicycle compatibility. The same roads were rated subjectively by the MetroWest Bicycle Committee to produce the MetroWest Bicycle Map in 2000. In addition, recent improvements in Cambridge on Massachusetts Avenue and Fresh Pond Parkway addressed bicycle concerns in the project design.

Access to Other Modes

Because bicycling and walking are most popular for trips under five miles and one mile respectively, they are used often to connect to other modes. Those who bicycle to transit connections either park their bicycle or take it on board. There are parking facilities at most MBTA stations, and they are added as a matter of course during station reconstruction. Crosstown bus routes are equipped with bicycle racks that can carry two bicycles. The MBTA has also instituted a capital program to expand bicycle parking facilities system-wide. This program dedicates transit enhancement funding in the amount of $50,000. The MBTA has also worked with the Massachusetts Bicycle Coalition (MassBike) to identify locations for bicycle racks, while MassHighway continues to address access issues through trail construction and roadway reconstruction projects.

Intercity Travel

The importance of passenger travel between cities is particularly acute in the densely populated New England and Northeast Corridor regions. The Boston region is the largest urbanized area in the six-state New England region. It is significant to intercity travel in New England both as the major trip generator and as the transportation hub for many trips in which Boston is not the point of origination or destination. Boston's Logan International Airport carries approximately 64% of all commercial air passenger trips that pass through the New England passenger airports, although the Boston area population comprises only about 25% of the six states total.

The Boston region is also the northernmost major metropolitan area in the Northeast Corridor. This corridor, which encompasses Washington, D.C., Baltimore, Philadelphia, New York City, Boston and the smaller urban areas in between, has historically generated more intercity travel than any other region of the nation. Even as the population of the United States has dispersed to the south

and west, the Northeast Corridor has remained the nation's largest generator of intercity traffic.

Boston's location at the northern end of the Northeast Corridor has led to its being a terminus for most of the intercity bus and rail traffic coming through the region from New York City and points south. Boston's proximity to New York City, the nation's largest metropolitan area, has created a situation where air, bus, and rail frequencies between the two cities surpass the levels seen in almost every other city pair in the United States outside of the Northeast Corridor. Automobile traffic on the major highway routes heading south along the corridor is also greater than that observed on other intercity highways between metropolitan areas outside of the region.

Airports

Airports located in the Boston region include Logan Airport and Hanscom Field. Logan Airport, located in East Boston, is owned and operated by MassPort and is the sixth busiest airport in the United States. Access to Logan Airport is greatly facilitated by its location less than two miles from downtown Boston. Approximately 19% of those currently traveling to or from Logan use public transportation. Planning is underway to improve transit access to the airport. A rebuilt Airport MBTA station and better connections with South Station via the Silver Line and the Airport Intermodal Transit Connector are two of the current projects designed to increase public transportation's share of the Logan air passenger market.

Hanscom Field, located in the towns of Bedford, Concord, Lexington, and Lincoln, is 15 miles northwest of downtown Boston and owned and operated by MassPort. It is the busiest general aviation airport in New England handling business, charter, private and air taxi flights. One commercial carrier operates out of Hanscom. Located three miles from I-95 and Route 128, it is accessible by car with public transportation provided by MBTA bus route #76 out of Alewife Station.

Intercity Rail

Amtrak, the nation's passenger rail system, offers daily departures from South Station and North Station in downtown Boston. Amtrak shares both North and South Station rail facilities with the MBTA's commuter rail service. Connections between these stations can also be made via the Red Line, Orange Line, and Green Line, as well as the intercity bus terminal. Departures from South Station, operate either along the Northeast Corridor route, providing service to Providence, New Haven, New York City, Philadelphia, Baltimore and Washington, D.C., or along the Inland route through Framingham, Worcester, Springfield, and Hartford, connecting with the Northeast Corridor route in New

Haven. The departures from North Station are for the Downeaster service, which runs between Boston and Portland.

The MBTA's commuter rail system provides service to other New England cities, although these trips are primarily scheduled to coincide with commuting patterns into Boston. The largest cities served by the commuter rail system are Providence and Worcester from South Station, and Lowell from North Station.

Intercity Bus

The vast majority of intercity bus trips that serve the Boston metropolitan area use the South Station bus terminal. Most of this travel is longer intercity trips, with some suburban commuter trips. Direct service is provided to most major cities and attractions within New England, as well as Montreal and Toronto.

Automobile

The largest share of intercity travel is by automobile. The automobile offers the convenience of traveling at a driver's discretion and the immediate incremental cost of travel is relatively low. Interstate 95 provides the only direct highway connection to New York City from the Boston metropolitan area. Between Boston and New York, I-95 also serves Providence, Rhode Island, and New Haven, Connecticut. I-95 continues south through the corridor to serve Philadelphia, Baltimore and Washington, D.C. The Massachusetts Turnpike (I-90) provides an alternative route to New York City and the rest of the Northeast Corridor from the Boston region. The primary variation of this route involves taking the Turnpike to Sturbridge, and then using Interstates 84 and 91 to connect with I-95 in southern Connecticut.

Freight Transportation

A key component of a healthy, vibrant economy for the Boston and New England region is the ability to efficiently move goods and freight within the region. The efficient movement of freight in the region requires an infrastructure that allows for the smooth transfer of goods to its final destination. Impediments to movement increase the delivery cost of goods and place a drag on the economy of the region. Approximately 95 percent of all freight shipped through the Port of Boston has a final destination within 75 miles. The main modes of freight movement within the region are truck, rail, water, and air, with the truck being the predominant mode for freight movement.

Truck

The trucking industry is a privately operated and highly competitive industry that depends upon the state and local authorities to maintain a safe and efficient

highway network. It is composed of several major types of operators including private fleets, long distance for-hire truckload (TL) carriers, and regional less-than-truckload (LTL) carriers. The United States economy depends on the trucking industry for a majority of the shipments of goods to factories, stores and households and each of these types of carriers depends on having a roadway network that meets its needs.

A major problem facing the trucking industry in the Boston region is the lack of a coordinated truck route policy. Because of the nature of how street patterns developed over the past 350 years, it is often common to have truck routes along heavily populated residential corridors. This causes a conflict between residents' desire for a quiet streetscape and the trucking industry's desire for a direct route between origin and destination. Under Massachusetts law, a community must gain permission from MassHighway before restricting truck traffic.

Rail
The rail industry is also a major operator of freight transportation within the Boston region, with CSX transportation being the major intermodal rail carrier. Major products shipped by rail include automobiles, chemicals, containers (with and without chassis) and bulk products. Over the last two decades, the trucking and rail industry have created a closer link to one another through the use of container shipping and double stacking. Primarily used over long routes, double-stacking has increased the competitive advantage for rail shipments. In the Boston region this has been a problem due to the lack of bridge clearances over railroad right-of-ways. The Port of Boston also has no direct rail access.

Water
Major categories of freight transported by water include refined petroleum products, liquid natural gas, dry bulk commodities (i.e. coal, sand, and scrap metal), containers, and automobiles. Major trade routes from Boston include barge traffic to New York and Canada and scheduled container ship service from Europe and Asia. The ports of the Boston region have played a key role in the economic development of New England since the 1600's. The main ports of the Boston region are located in Boston, Gloucester, and Salem.

Air
Freight transported by air usually contains at least one of the following characteristics: time sensitive, high value-to-weight ration, and perishable. Logan Airport serves as the only air freight terminal in the Boston region and major intermodal freight movement between air freight and its final destination is by truck. There is no freight rail access to Logan Airport, and no provisions for future rail access is likely to develop. In 1998, Logan Airport ranked 36th in the world in terms of cargo handled.

CHAPTER 3: THE PLAN PROCESS

Federal planning regulations require a transportation plan to be developed every three years. The last full Boston Region MPO Transportation Plan was adopted in January 2001. At that time, the Federal Highway Administration and Federal Transit Administration was conducting its triennial review of the Boston Region MPO's planning process. The MPO planning process was re-certified, subject to the completion of five corrective actions, one that included the issuance of an updated Transportation Plan implementing improvements to the MPO's approach to environmental justice. The Transportation Plan Update was adopted in March 2002 and as part of the Update, the MPO underwent an extensive public outreach process to solicit public comments regarding the guiding policies of the plan, land use policies, project selection, and environmental justice issues.

The MPO has built upon the work done for the 2000 Plan Update in the development of this Plan. This chapter outlines the process used in the adoption of the 2004 Plan.

The Public Outreach Process

In 2001 and 2002, the MPO implemented an aggressive program of public involvement during the development of the 2000-2025 Plan Update. They agreed to build upon this outreach in the development of this Plan. There were many approaches used during the public outreach process, as described below.

During the development of the 2000-2025 Plan Update, the MPO conducted the following public outreach throughout the region:

- The Regional Transportation Advisory Council discussed the Plan Update at its monthly meetings between October 2001 and January 2002. They also convened a subcommittee to review the Plan Update and assist the Advisory Council in making recommendations.
- The MAPC subregions discussed the Plan Update throughout the fall 2001 and early winter 2002. The subregions made comments during their meetings and many submitted written comments.
- Six workshops and one regional meeting were held in the fall of 2001 with discussions of plan policies, projects, and land use scenarios.
- Seven public workshops were conducted on the draft 2000-2025 Plan Update in winter 2002.
- Five public workshops were held to discuss the Environmental Justice Addendum to the 2000-2025 Plan and Work Scope in summer 2002.

Building upon this input, the MPO continued the public outreach process in developing the 2004 Plan. This included:

- Discussion with the Advisory Council beginning in January 2003,
- Discussion with the MAPC subregions beginning in January 2003, including eight visioning/prioritization workshops in spring 2003, and
- Holding four public workshops on all certification documents including the 2004 Plan in spring 2003.

Two more MPO public workshops and an open house will be held during the public comment period for the 2004 Plan in summer 2003.

The Advisory Council is a primary avenue for public input into the development of MPO documents. In addition, the Council has a Regional Transportation Plan Subcommittee responsible for providing input to MPO staff as the Plan is developed and guiding development of formal Council comments on the draft Plan.

The MPO also works with the MAPC Subregions on an on-going basis, co-sponsoring many public discussions, attending monthly meetings, and working with Subregions to solicit views and priorities.

The MPO used new and better means of promoting awareness of MPO processes. A one-way, E-mail list server is used to contact individuals about upcoming events. The list includes municipal officials, legislators, local and regional transportation activists, and interested citizens. It is frequently updated and all workshop attendees and other citizens who so request are added. Press releases, distributed to all major and most local newspapers in the region, announce public workshops and events. Some notices are also sent via fax.

The MPO now consistently uses its Web site (http://www.bostonmpo) to post upcoming meetings, agendas, and meeting minutes, and promotes its site at all public discussions. Particularly notable is the site's improved process for commenting.

All workshops are held in accessible venues and materials are available in accessible formats.

The MPO continues to rely on its newsletter, TRANSREPORT, to provide the public with information on MPO certification activities. TRANSREPORT provides wide circulation (more than 2,500 individuals and organizations) of transportation information to a targeted population with a history of interest in transportation issues.

Public Comment

Numerous public comments were received from the MPO public outreach process described above. MAPC Subregions also identified their priorities for projects and made other recommendations. Citizens attending the MPO workshops both gathered and provided information. A summary of written public comments received during the development of the 2004 Plan is included in Appendix J.

Environmental Justice

Environmental justice was an important factor in the development of the 2004 Plan. MPO policy promotes the equitable sharing of the region's transportation system benefits and burdens as well as participation in decision-making. To implement this policy, the MPO has organized a collaborative process with representatives of environmental justice communities; has adopted a definition of environmental justice; identified communities of concern, developed measures (which it is using to formulate the Plan); and conducted a systems-level analysis of environmental justice for the region that follows national best practices and is discussed in detail in Chapter 6. The MPO worked closely with the FHWA and FTA to formulate this process.

Environmental Justice Committee

An MPO Standing Environmental Justice Committee was created in Spring 2002 to expand on the work accomplished by its predecessor, the MPO Environmental Justice Ad Hoc Committee, which was organized in the Fall 2000. The Standing Committee's role is to provide input and guidance to the MPO in the consideration of the equitable distribution of transportation benefits and burdens. The goal is to engage, over the long-term, low income and minority communities in this work. It provides a forum for traditionally under-served constituencies to provide input into the MPO's transportation planning.

Committee members are representatives from neighborhoods and communities with high percentages of low income or minority residents and are leaders in community development, community action, or social services. There are six members representing the urban core, three members representing the area between the urban core and Route 128, three members representing the area outside Route 128, and one member representing the state's Executive Office of Environmental Affairs, an agency with an active environmental justice program. Eight MPO members and a representative of the Regional Transportation

Advisory Council also participate on the committee. Committee members were invited to participate by the MPO.

Committee members include:

- Alternatives for Community & Environment (Roxbury area)
- Asian Community Development Corporation (Chinatown area)
- Chelsea Greenspace Committee (Chelsea, East Boston area)
- Four Corners Coalition (Dorchester area)
- Somerville Community Development Corporation (Somerville, Cambridge area)
- Tent City Corporation (Mattapan area)
- South Coastal Workforce Board (Quincy area)
- Waltham Alliance to Create Housing (Waltham area)
- Tri-City Community Action (Malden, Medford, Everett area)
- Action, Inc. (Gloucester area)
- Salem Harbor Community Development Corporation (Salem, Lynn area)
- South Middlesex Opportunity Council (Framingham, Marlborough area)
- Executive Office of Environmental Affairs
- Town of Bedford (MPO)
- City of Boston (MPO)
- Town of Hopkinton (MPO)
- Executive Office of Transportation and Construction (MPO)
- Massachusetts Bay Transportation Authority (MPO)
- Massachusetts Highway Department (MPO)
- Metropolitan Area Planning Council (MPO)
- MBTA Advisory Board (MPO)
- Regional Transportation Advisory Council (advisory to MPO)

Committee Process and Products

Fourteen meetings were held to provide input for the system-level analysis for the 2004 Plan and other issues. Several meetings were held to provide a base of information for members and elicit comments to guide the development of the Addendum to the 2000 Plan Update and the Environmental Justice system-level analysis work scope. Others were forums for seeking guidance for the data collection and analysis and for discussing work products and the results. Some members hosted Environmental Justice Committee meetings in their communities to provide members an opportunity to get to know their area.

Members provided detailed presentations on existing conditions and important transportation needs in their communities. This information was incorporated into community profiles and needs analyses. The community profiles are

provided in Appendix B. The Committee made numerous comments and gave important guidance for the environmental justice work. The committee prepared language that was included in the Environmental Justice Addendum to the 2000 Plan Update, identified additional data to be collected as part of the work scope for the environmental justice system-level analysis for the 2004 Plan, and provided guidance for future considerations. Reviewing mapping and data prepared by the MPO, it provided input and defined:

- MPO environmental justice target populations
- Specific communities of concern (see Chapter 6)
- Destinations to be evaluated, including employment sectors and higher education and health care institutions.

Members also provided numerous suggestions for the analysis, made requests for additional information, and made specific recommendations for projects to be included in the 2025 Build analysis, which can be found in Appendix B. MPO analysis focused on mobility, accessibility, and environmental results of the 2025 No-Build scenario and two 2025 Build Scenarios. These results are provided in Chapter 6 and Appendix B.

The MPO will continue to rely on the Environmental Justice committee to identify projects and programs that meet environmental justice neighborhood transportation needs. New information will be included in future Transportation Plans, Transportation Improvement Programs, and Unified Planning Work Programs.

Universe of Projects

One of the primary outcomes of the Regional Transportation Plan is the development of a list of major capital expansion projects for implementation over the next twenty-two years. To select these projects, the MPO used two processes for creating a Universe of Projects (a list of all possible projects for selection) – one for highway projects, the other for transit projects.

Highway Projects

The Highway Universe of Projects list is comprised of those projects included in a previously adopted Regional Transportation Plan; projects previously studied, under study or in development; and projects included in comments received during the public outreach process for both the previous 2000-2025 Plan and this 2004-2025 Plan. The Highway Universe of Projects List can be found in Appendix C.

Transit Projects

The MBTA recently adopted their *Program for Mass Transportation* (PMT) which defines a vision for regional mass transportation and sets priorities for infrastructure investments in the areas of system preservation, service enhancements, and system expansion. The PMT process included extensive public outreach generating hundreds of project ideas. These ideas were included in the universe of projects evaluated in the PMT. This expansive list was shortened to include a feasible list of projects that warranted further evaluation. Consistent criteria were identified to conduct the screening process. The screening process led to approximately 60 projects which were considered in the 2004 Plan. For a more detailed discussion on the screening methodology refer to the MPO's website at www.bostonmpo.org under the MBTA *Program for Mass Transportation* button. The Transit Universe of Projects list containing both the screened and unscreened projects can be found in Appendix C.

The Use of Goals and Policies in the Selection of Highway Projects

The MPO devoted a considerable amount of time toward the development of the guiding policies during the 2000-2025 Plan process. A complete list of the policies guiding the development of the Transportation Plan is provided in Chapter 5. The MPO decided to use these policies in the project selection process of the 2004 Plan. Each highway project included in the Universe of Projects with a defined description was rated according to its perceived impact on ten of the twelve policies.

- Land Use
- Safety and Security
- Mobility
- Air Quality
- Connection Among Modes
- Accessibility
- Environmental Justice
- Preservation or Modernization of the System
- Economic Opportunities
- Community Preservation

The two policies not rated (public involvement and innovative financing) are not applicable to this exercise. The evaluation included three ratings – high, medium, and low. An explanation of the rating system and a matrix summarizing the evaluation of projects are found in Appendix D.

The Use of the Program for Mass Transportation in the Selection of Transit Projects

As discussed above, the screened list of projects from the PMT was considered for transit project selection in the development of this Plan. Within the PMT, this list was further evaluated and prioritized using performance measures to determine how well each project met the PMT goals and objectives. These goals and objectives are consistent with the Boston MPO's regional policies. The projects were evaluated based on thirty-five individual performance measures divided into seven categories including:

- Utilization
- Mobility
- Cost-Effectiveness
- Air Quality
- Service Quality
- Economic and Land Use Impacts
- Environmental Justice

Within the cost-effectiveness category, performance measures were used that considered project impacts on both existing and new riders.

A list of the transit expansion projects broken down by mode (rapid transit, bus and trackless trolley, commuter rail and boat project) and their overall evaluations are provided in Appendix D. The evaluation included a high, medium, and low rating system.

Development of Demographic Forecasts

As part of the 2004-2025 Regional Transportation Plan process, the MPO projected what the land use will be in the year 2025. This includes the development of population, employment, and household projections and their allocation throughout the region. The process of integrating land use considerations began during the development of the 2002 Plan Update with the review of two different land use scenarios – Basic Forecast and Targeted Growth.

- Basic Forecast assumes that past growth areas will continue to be attractive; existing resources and infrastructure constraints are overcome and do not limit development; and large numbers of people will move to, or commute into the Eastern Massachusetts area in response to large numbers of new jobs.
- Targeted Growth will occur in areas with adequate water and sewer capacities and existing transit infrastructure.

These two growth scenarios were presented for public review in meetings held around the region in 2000 and 2001 and were subject to discussion by the MPO. Ultimately, the targeted growth land use was selected as the preferred land use alternative for the 2002 Plan Update. The MPO made the decision to continue using the targeted growth assumptions in the development of the 2004 Plan. A detailed description of the development of the population, employment, and household projections under the Targeted Growth land use scenario is included in Appendix E.

Transportation Demand Model

In developing the Transportation Plan, it was necessary to conceptualize the region's transportation needs over the next 22 years. Land use patterns, growth in employment and population, and trends in travel patterns all create different demands on the region's transportation system. In order to estimate future demands on the system for this Plan, the MPO utilized a regional travel-demand forecast model. The model is a planning tool used to evaluate the impacts of transportation alternatives given varying assumptions with regard to population, employment and land use, etc. The model also can be used to assess potential projects in terms of air quality benefits, travel times, and congestion reduction.

Travel Demand Model Characteristics

The travel model set simulates existing travel conditions and forecasts future-year travel on the Eastern Massachusetts transit and highway system. To get a more accurate picture of the travel demands in the Boston region, the Eastern Massachusetts Regional Planning Project (EMRPP) area is used. The EMRPP region includes an additional 63 communities outside of the 101-municipality Boston Region MPO.

The model contains all MBTA rail and bus lines, all private express bus carriers, all express highways and principal arterials, and many minor arterials and local roadways. The region is subdivided into almost one thousand traffic analysis zones (TAZ). The model set simulates transportation supply characteristics and transportation demand for a zone to every other zone, and does this for all TAZ. This simulation is the result of several inputs, the most important include population, employment, auto ownership, transit fares and automobile costs, and highway and transit levels of service. These inputs are updated on a regular basis to ensure the reliability of the forecasts. The model set, which is similar in nature to those used in most other large urban areas in North America, also incorporates many new procedures, including the ability to forecast non-motorized trips and constraint for parking at MBTA stations.

Forecast of 2000 Base Case, 2025 No-Build, and 2025 Build Conditions

The travel model analysis for the Transportation Plan consisted of several steps. First, an existing conditions network was tested to simulate recent (2000) travel conditions. Appendix F describes all major highway and transit projects that were open for public use by December 31, 2000. Projects included for analysis in the model were "regionally significant" as defined by the federal government. They were regional in nature, added capacity and had air quality impacts as measured by the model.

A future 2025 No-Build alternative was then coded and modeled. The 2025 No-Build alternative assumed only those improvements that will be made between 2000 and 2025. Descriptions of the 2025 No-Build projects are included in Appendix F. The 2000 Base Case and 2025 No-Build scenarios provided a baseline against which the predicted effects of potential future investments in the transportation system are measured.

Next, two alternative sets of projects (2025 Build Scenarios) were developed and compared to the 2025 No-Build scenario (see Development of 2025 Build Scenarios below). Then, these results and other measures, including policies and public comments, were reviewed. A final set of projects was recommended, coded and modeled. Using the No-Build analysis as a point of reference, the model runs helped to measure the effectiveness of each future action alternative.

The forecast for the 2025 No-Build and Build scenarios used the 2025 demographic data developed by MAPC using the Targeted Growth scenario assumptions. Several important travel statistics were summarized for each of these model runs, including:

- Total vehicle miles of travel (VMT) and vehicle hours of travel (VHT) on a typical weekday.
- Average speed of highway traffic.
- Amount of air pollution produced by automobile and transit vehicles.
- Total number of daily trips made by auto and transit.
- Average daily transit ridership by mode (bus, subway, commuter rail, etc.).
- Percentage of people traveling by each of the travel modes.

Selected model data results from the 2000 Base Case and 2025 No-Build alternatives are included in Appendix H.

Development of 2025 Build Scenarios

The MPO used the Universe of Projects as a source for selecting projects to model in the 2025 Build Scenarios. As discussed above the results of the regional travel demand model were one of the inputs used by the MPO to determine the merits of possible projects. In addition to these results, the MPO also received information produced on projects through feasibility studies, project specific studies, project-specific modeling work, and environmental impact reports. This modeling information can be found in Appendix H.

In addition, each highway project was reviewed for conformity with the MPO's transportation policies. PMT prioritizations were reviewed for each transit project. The MPO also reviewed comments from the Regional Transportation Advisory Council, the Environmental Justice Committee, the MAPC Sub-regional Committees, and public comments received from outreach sessions held during the development of this Plan and the 2000 Plan Update.

Using these inputs, the MPO developed two transportation project lists for modeling. The two model alternatives were developed based on the "information produced" (meaning highway projects were eligible to be included if there was sufficient project information to do network coding, and if a cost estimate existed, and transit projects were eligible if they were included in the PMT). Projects for which this information was not available or that were prescreened out of the PMT were not included in the project lists.

Alternative One was based on the projects that were recommended in the 2000 Plan Update adopted in March 2002. The MPO felt that this was a good starting point based on the amount of work and public review that had been completed within the last two years. All highway projects were again reviewed using the inputs outlined above. The transit projects were reviewed using information and prioritization provided by the newly adopted PMT.

Alternative Two was developed to provide model results for a high-interest project that was not included in the first alternative. This was based upon a recommendation of the MPO's Environmental Justice Committee (see Appendix B). Alternative Two was essentially the same as the first alternative with the exception that it included the conversion of the Dudley/Boylston section of the existing Silver Line to light rail in place of the Silver Line Phase III project.

The listing of the projects in the two alternatives is included in Appendix G. The final recommended project network segregated funding by use: highway

revenues were used for highway projects and transit revenues were used for transit projects.

The model results for the two transportation alternatives using the Targeted Growth land use scenario are summarized in Appendix H.

CHAPTER 4: THE FINANCIAL PLAN

Introduction

Federal regulations require the Regional Transportation Plan to include a financial plan comparing the estimated transportation revenue from existing and available sources, both public and private, with the estimated cost of constructing, maintaining, and operating the existing and planned transportation system. If this comparison reveals a revenue shortfall, the financial plan must identify proposed sources for the additional revenue necessary to cover the shortfall and provide strategies for ensuring the availability of such revenue.

This financial plan is limited to the components of the regional transportation system over which the Boston Region MPO has some funding or programming jurisdiction. These components are the Central Artery Project (the Project), the statewide road and bridge system, and the regional public transportation system.

The Central Artery Project

In December of 2002, the Federal Highway Administration (FHWA) approved the latest Central Artery Finance Plan submitted by the Massachusetts Turnpike Authority. The MPO reviewed the Finance Plan and accepted the projections contained in the plan. The cost and revenue projections for the Central Artery Project (Central Artery) in this Regional Transportation Plan are based on the Central Artery Finance Plan.

As of December 2002, the Central Artery cost is estimated at $14.625 billion. Over $13.3 billion is committed with almost 87 percent of construction scope under contract. $12.1 billion is expended of the $14.625 billion total estimate. The project is considered 87 percent complete. $2.5 billion remains to be expended by the Project.

Project Funding

The Central Artery Project is funded through the following seven sources:

1) Federal Reimbursements ($7.049 billion)
2) Grant Anticipation Notes ($1.500 billion)
3) Commonwealth Bonds ($1.588 billion)
4) Transportation Infrastructure Funds ($2.343 billion)
5) Massachusetts Port Authority Funds ($300 million)
6) Massachusetts Turnpike Authority Funds ($1.650 billion)
7) Insurance Trust Revenue ($150 million)

Federal Funding

Excluding Grant Anticipation Notes (GANs), federal aid accounts for 48 percent of Project funding. Accounting for full federal reimbursement for the GANs principal (the Commonwealth funds yearly interest payments from annual appropriations, while principal payments will be drawn from future federal highway apportionments), the federal portion is approximately 58 percent. On May 8, 2000, FHWA instituted an administrative cap on the Project. Under this cap, the Project cannot exceed $7.049 billion in federal obligations plus $1.500 billion in GANs repayments for a total federal participation level of $8.549 billion.

State Funds

Like all federally funded highway projects, the Central Artery Project requires matching funds from state sources. General obligation bonds, revenue from two trust funds, Massachusetts Port Authority and Massachusetts Turnpike Authority comprise the state matching funds for the Central Artery Project.

General obligation bonds are estimated to contribute up to $1.588 billion to the Central Artery Project.

The revenue from the Insurance Trust fund is estimated to generate $150 million for the Central Artery project in the Central Artery Finance Plan.

In May 2000, the state legislature enacted enabling legislation creating the Central Artery and Statewide Road and Infrastructure Trust Fund. The Infrastructure Trust Fund authorized $1.35 billion in bonds to be funded from reinstated registry and license fees, $200 million from the Massachusetts Turnpike Authority, $65 million from the Massachusetts Port Authority, Commonwealth debt service savings and investment earnings on balances in the Fund. The projections for the performance of the fund are based on a number of factors including market forces, which are only estimated by the Central Artery Finance Plan.

The Massachusetts Port Authority is statutorily obliged pursuant to the Metropolitan Highway System legislation (Chapter 3 of the Acts of 1997 - M.G.L. Chapter 81A) to purchase not less than $200 million of assets built as part of the Central Artery Project. A joint assessment study concluded that is was appropriate for MassPort to acquire certain segments of the Central Artery Project located near Logan Airport and to pay $300 million in the exchange. In addition, MassPort has contributed $65 million to the Infrastructure Trust Fund.

The Massachusetts Turnpike Authority is expected to contribute up to $1.85 billion (including the $200 million to the Infrastructure Trust Fund) to the construction of the

Central Artery. The Turnpike Authority entered into a Memorandum of Understanding with the Executive Office of Administration and Finance and the Executive Office of Transportation and Construction in February 1999 that amended and restated an earlier Memorandum of Understanding. Section 2 of the 1999 Memorandum of Understanding permits the Turnpike Authority to make payments by transferring funds directly to the Commonwealth's Capital Expenditure Reserve Fund or by directly paying on behalf of the Commonwealth amounts owed to third parties in connection with any portion of the Central Artery Project.

Table 4-1
Total Central Artery Project Expenditures by Funding Source
($ in millions)

Federal Funds	**Expended**	**Remaining**	**Total**
Federal Reimbursements	6,354	695	7,049
Grant Anticipation Notes	1,484	16	1,500
State Funds			
Commonwealth Bonds	1,380	207	1,588
Infrastructure Trust Fund	1,125	1,128	2,343
Massachusetts Port Authority Funds	298	2	300
Massachusetts Turnpike Authority Funds	1,351	299	1,650
Insurance Trust Revenue	45	105	150
Totals	12,082	2,543	14,625

Remaining Central Artery Project Obligations

The Boston MPO estimates it will program $1.385 billion in federal funding from FY2004- FY2009 and $0.912 billion from FY2010-FY2013 to the Central Artery Project. (This includes remaining federal reimbursements and repayment of the GANS.) The GANs repayment schedule from the Central Artery Finance Plan indicates $131 million repayment in FFY2005, $225 million FFY2006-FFY2011 and $16 million in FFY2012. Once completed in 2005, the Central Artery Project will be operated by the Massachusetts Turnpike Authority.

The Statewide Road and Bridge System

The MPO has forecast highway revenues through 2025. The projections for 2004-2009 are the TIP targets provided to the MPO by MassHighway. The funding for 2010 through 2025 is a level-funded projection of 2009 revenues.

Highway revenues consist of federal and state funds made available on an annual basis to MassHighway. MassHighway has projected Federal funds based upon current apportionment levels, while state funds are based upon recent trends in non-Artery funding. Funding available for the statewide road and bridge program is determined after deducting certain programs off-the-top. These off-the-top programs include the Central Artery, other regions' mega-projects, the Route 3 North Project, and statewide items (planning, extra work orders, and infrastructure maintenance). Table 4-2 shows projections of available highway revenue in two six-year increments (2004-2009, 2010-2015) and the remaining ten years (2016-2025).

In September 2000, in order to meet the needs of non-Artery roadway projects, the state and its MPOs executed a Memorandum of Understanding of the Task Force of State and Regional Officials to Define, Develop and Monitor a Statewide Road and Bridge Program (Statewide Road and Bridge MOU). The Statewide Road and Bridge MOU commits MassHighway to expend no less than $400 million per year on non-Artery transportation projects in the remaining years of Artery construction (through FY 2005).

For programming and planning purposes, the Massachusetts Association of Regional Planning Agencies (MARPA) developed targets for use in apportioning highway funding among the MPOs. Under the MARPA targets, the Boston Region MPO assumes that it will receive approximately 43% of all available highway funds. Based on that assumption and the projections contained in Table 4-2, the Boston Region MPO can expect to receive an average annual allocation of approximately $113 million during the remaining years of Artery funding (2004-2013) and an average of approximately $283 million per year thereafter.

Between FY 1996 and FY 2000, the MPO dedicated approximately 90.8% of Non-Artery highway revenues to system maintenance and improvement, while obligating approximately 9.2% to system expansion. System maintenance and improvement includes infrastructure projects, such as bridge rehabilitation or highway reconstruction, and system enhancements, such as the construction of pedestrian or bicycle facilities or the signalization of intersections. System expansion means additional roadway capacity through either reconstruction projects or new roadways. It should be noted that the large percentage of funds that was obligated for system maintenance and improvement during fiscal years 1996–2000 was, in part, a function of the fact that the Central Artery Project was the only large multiyear capital project funded in the MPO region. However, the effect of the Artery on the region's non-Artery program is beginning to lessen. In the current Transportation Improvement Program, the MPO has committed approximately 32% of its highway funding to expansion projects, while programming 68% for system maintenance and improvement.

TABLE 4-2
Highway Finances 2004-2025

	2004-2009	2010-2015	2016-2025	Total
Statewide Federal Apportionment	3,358	3,426	5,710	12,494
less Central Artery Share	1,679	911	0	2,590
Subtotal Statewide Road & Bridge Program	1,679	2,516	5,710	9,905
Multiply by 0.913 for Obligation Authority	1,533	2,297	5,213	9,043
less Regional Major Infrastructure Projects	380	0	0	380
less Route 3 North A/C Conversions	0	480	160	640
less Statewide Items	490	388	646	1,524
Subtotal of Deductions	869	868	806	2,543
Balance Available for Regions	664	1,429	4,407	6,500
Matching Funds Provided by the State	166	357	1,102	1,625
Subtotal Regional Federal Aid Program	830	1,786	5,509	8,125
Multiply by 0.43 for Boston MPO Share	357	768	2,369	3,494
Non-Federal Aid Program	0	0	0	0
Subtotal Boston MPO Highway Funding	357	768	2,369	3,494
Unobligated HPP Funds from TEA 21	62	0	0	62
Boston MPO "Share" of Statewide Items	191	237	542	970
Total Plan Highway Program	610	1,005	2,911	4,526

Boston MPO Highway Funds	**2004-2009**	**2010-2015**	**2016-2025**	**Total**
Total Federal Funds	286	614	1,895	2,795
Total Non-Federal Funds	71	154	474	699
Boston MPO "Share" of Statewide Items	191	237	542	970
Unobligated HPP Funds from TEA 21	62	0	0	62
Total Funding	610	1,005	2,911	4,526
70% Available for Maintenance & Improvem	427	703	2,038	3,168
30% Available for Expansion Projects	183	301	873	1,358

Based upon historic trends, the MPO has determined that the appropriate level of funding for capital maintenance and improvement over the life of the Transportation Plan should be established at approximately 70% of available funding. This level of spending will require $3.168 billion for system maintenance and improvements over the 22-year period of this Regional Transportation Plan. The remaining 30%, or approximately $1.358 billion, will be used for necessary highway capacity improvements. Table 4-2 shows the level of funding available for the Maintenance and Improvement program and the Capacity program for 2004-2009, 2010-2015, and 2016-2025.

The Regional Public Transportation System

The most recent long-range projections of MBTA future costs and revenues are contained in the finance plan of the Silver Line Phase III New Start Application. These are used as the basis for projections in the development of the 2004 Regional Transportation Plan. However, the Silver Line projections extend only as far as the year 2021, whereas the Transportation Plan calls for projections through the year 2025. Consequently, figures for the years 2021 to 2025 are based on extrapolations of the trends assumed in the Silver Line projections.

Prior to the year 2000, the MBTA, although nominally an independent authority, operated as a quasi-state agency for budgetary purposes. MBTA capital bonds were backed by the Commonwealth, and operating costs were primarily funded by annual appropriations. Forward funding legislation, which became effective July 1, 2000, dramatically altered this relationship. As part of the legislation, one cent of the state sales tax was dedicated to the MBTA in addition to local assessments and the MBTA was made responsible for funding its operating costs and its capital program. Henceforth, all bonds issued by the Authority are no longer pledges of the state, but are instead backed by MBTA revenue. It is, however anticipated that the General Court (state legislature) will appropriate additional capital funds for projects required by legal commitments pre-dating the Forward Funding legislation, or for other projects mandated by new legislation. (See Chapter 161, Section 18 of the Massachusetts General Laws, as amended by the Commonwealth's Fiscal Year 2000 Budget)

MBTA operations and maintenance costs consist of standard operating expenses, prior obligation debt service (principal and interest payments on bonds outstanding on July 1, 2000), and prior obligation lease payments. Standard operating expenses include: wages and fringe benefits; administrative costs; materials purchased for routine, non-capital maintenance; fuel and electrical power; and the costs of similar goods and services necessary to keep the regional public transportation system running. In the Silver Line finance plan, operating expenses for each year from 2004 to 2021 are

projected to be 2% greater than those of the previous year. Additional allowances are made for net operating costs (fare revenues minus operating costs) of expansion projects assumed to be implemented within this time frame. The Regional Transportation Plan extrapolates these projections to 2025. Over the life of this Plan, projected operating expenses are approximately $22.9 billion.

As mentioned earlier, prior to the enactment of the Forward Funding legislation, MBTA bonds were backed by the Commonwealth. Upon the effective date of the legislation, however, contract payments from the state ceased and all outstanding debt became the responsibility of the MBTA. The projected debt service payments of these debts over the period of this Transportation Plan equal approximately $5.261 billion.

Like debt service costs, obligations under prior lease agreements became the sole responsibility of the MBTA upon the effective date of the forward funding legislation. These lease payments are related primarily to "Safe Harbor" lease agreements executed in the 1980s for various MBTA rolling stock. Under such agreements, non-federal shares of rolling stock were sold to private corporations and leased back to the MBTA. (The corporations received tax benefits for such transactions, in the form of deductions for depreciation.) The last of these leases will terminate in 2013. Payments for the years 2004 through 2013 will total approximately $130 million.

An additional requirement of the Forward Funding legislation was a mandate that the MBTA maintain a cash surplus equal to 0.5% of the sum of the annual allocation to the Authority from the state sales tax and assessments on cities and towns in the MBTA district. Over the life of this Transportation Plan, this requirement equals approximately $138 million. Table 4-3 shows the projected operations and maintenance costs of the current MBTA system from 2004 through 2025.

Table 4-3
Projected MBTA Operations and Maintenance Costs of the Existing System

	2004-2009	2010-2015	2016-2021	2022-2025	Total
Standard Operation and Maintenance Costs	$5,261,000,000	$5,949,000,000	$6,729,000,000	4,966,000,000	$22,905,000,000
Prior Debt Service	$1,628,000,000	$1,602,000,000	$1,227,000,000	$804,000,000	$5,261,000,000
Operating Lease Payments	$86,000,000	$44,000,000	$0	$0	$130,000,000
Legislatively Required Operating Surplus	27,000,000	$34,000,000	$43,000,000	$34,000,000	$138,000,000
Total Operating Costs	$7,002,000,000	$7,629,000,000	$7,999,000,000	$5,804,000,000	$28,434,000,000

The revenues available to fund the operation and maintenance costs of the MBTA over the life of the Plan come from the following sources: operating revenue, dedicated sales

tax revenue, local assessments, and non-fare revenue. (Under anticipated allocation formulas, the MBTA will not receive federal aid for operating expenses.) Table 4-4 shows the projected revenue of the current MBTA system over the period of the Transportation Plan, 2004 to 2025.

Table 4-4
Projected MBTA Operating Revenue from the Existing System

	2004-2009	2010-2015	2016-2021	2022-2025	Total
Base Operating Revenue	$1,710,000,000	$1,710,000,000	$1,710,000,000	$1,140,000,000	$6,270,000,000
Ridership Growth	$87,000,000	$121,000,000	$121,000,000	$80,000,000	$409,000,000
Fare Increases	$188,000,000	$427,000,000	$595,000,000	$477,000,000	$1,687,000,000
Sales Tax	$4,645,000,000	$5,874,000,000	$7,432,000,000	$6,021,000,000	$23,972,000,000
Local Assessments	$842,000,000	$959,000,000	$1,112,000,000	$838,000,000	$3,751,000,000
Non-Fare Revenue	$378,000,000	$414,000,000	$414,000,000	$276,000,000	$1,482,000,000
Total MBTA Revenue	$7,850,000,000	$9,505,000,000	$11,384,000,000	$8,832,000,000	$37,571,000,000

In the Silver Line Phase III finance plan, operating revenue projections start with a base of $285 million per year for current ridership levels at current fares. With no other changes this would result in revenue of $6.27 billion over the life of the plan. Fare increases of 9.9% at various times during the Plan period would generate an additional $1.69 billion. Ridership growth would account for another $409 million. The Silver Line projections assume ridership growth of about 1% per year over the base level from 2004 to 2009, with constant ridership thereafter. This includes only anticipated ridership growth on the current system (i.e. excluding growth from planned projects).

As mentioned earlier, the Forward Funding legislation dedicated the proceeds of one cent of state sales tax to the MBTA. The legislation also provides for floor amounts, related to the amount of state funding that the MBTA would have received under prior formulas. The Silver Line finance plan starts with a base of $664 million in sales tax revenue for 2002. This amount is estimated to increase by 3% in each year from 2003 through 2005, and by 4% per year for each year thereafter. In the Transportation Plan estimates, the 4% growth is carried out to 2025. Over the period 2004 to 2025 projected sales tax revenue equals approximately $23.972 billion.

In addition to the sales tax revenue, the MBTA is provided funding through local assessments in accordance with a statutory formula. Each community within the 175 municipality MBTA district is annually assessed a fee under this formula, which is automatically withheld by the Legislature from quarterly local aid distributions. The Forward Funding legislation established the total amount of assessments within the district at $144.5 million for 2001, but also provided for a gradual reduction in the assessments back down to 2000 levels ($136 million) between 2001 and 2006. The Silver

Line finance plan uses these figures, then assumes a 2.5% growth (the maximum annual growth allowed under the limitations established by Proposition 2 ½) in each year starting in 2007. In the Transportation Plan estimates, the 2.5% growth is carried out to 2025. Over the period 2004 to 2025 projected local assessment revenue equals approximately $3.75 billion.

The final component of the system revenue is non-fare revenue, such as that derived from parking, concessions, advertisements on vehicles and in stations, and the sale of surplus property. The MBTA has increasingly worked to maximize this revenue, as evidenced by a multi-million dollar, multi-year advertisement contract awarded in 2001. The Silver Line finance plan projects that non-fare revenue will amount to $54 million in 2003, increasing to $64 million in 2006 and to $69 million in 2009. After 2009 non-fare revenue is assumed to remain constant at $69 million per year. In the Transportation Plan estimates, the $69 million per year is carried out to 2025. Over the period 2004 to 2025 projected non-fare revenue equals approximately $1.48 billion.

As shown earlier in Table 4-3, the projected operations and maintenance costs of the MBTA over the period of this Transportation Plan are $28.434 billion, while Table 4-4 shows revenues of $37.571 billion, leaving a projected surplus of $9.137 billion. These funds are projected to be available to fund the MBTA's capital program through a combination of pay-as-you-go (PAYGO) funding and as a pledge for revenue bonds to fund the capital program.

The MBTA capital program is composed of four funding programs: federal aid, bond proceeds, PAYGO capital, and special state appropriations. The Silver Line finance plan assumes that the MBTA will gradually transition from a capital program that relies primarily on bonding to one that requires little, if any, bond proceeds. Consequently, revenue bond proceeds are assumed to decline each year from 2004 to 2009, increase slightly in 2010 then decline again and cease after 2013. Total proceeds from this source from 2004 to 2013 are estimated at $1.867 billion.

The current federal appropriations program will expire shortly, and details of a new program have not yet been finalized. In this Transportation Plan, the figures for non-discretionary federal funds are based on an assumption that the annual appropriation to the MBTA in each year from 2004 to 2025 will be the same ($166 million per year) as was allocated in 2003 under the current program. The figure for 2004 also includes a carryover of funds previously awarded but not yet spent. This results in a total estimate of $3.823 billion in federal funds from 2004 to 2025, excluding New-Start grants.

Federal New-Start funds are estimated to be secured for three projects. Between 2004 and 2013, $380 million for Silver Line Phase 3 is anticipated. From 2016 to 2021, $491 million for Urban Ring phases 1 and 2 is assumed. Funding for this project will be

available between 2010 to 2015, but the majority will be available between 2016 to 2025. From 2022 to 2025, $311 million for North Shore Transit Improvements is assumed. The combined total of New Start funds for these projects, along with a carryover of $3 million from before 2004, would be $1.185 billion. The total federal aid projected to be available to the MBTA during the period of this Transportation Plan is $5.008 billion.

After accounting for federal aid, the MBTA capital program is divided between bond proceeds and PAYGO capital in a ratio sufficient to fund the program at predetermined levels. In the short-term, the Silver Line finance plan relies on bond proceeds for a large portion of the capital program but gradually transitions to a limited bond program. Over the first 10 years of the Transportation Plan, the finance plan estimates that the MBTA will issue bonds yielding approximately $1.867 billion in net bond proceeds (face value less debt service reserve and cost of issuance). Thereafter, the finance plan provides for no issuance of bonds and relies entirely on PAYGO capital, federal aid, and state appropriations (for prior legal commitments or new directives) to fund the program.

The level of PAYGO funding is primarily a function of other available funding sources and MBTA policy concerning the efficacy of maintaining, increasing, or limiting its bonded indebtedness. During 2004-2008, while bond issuances are rather large, there will be virtually no PAYGO capital because most excess revenue will be used to pay debt service on new bond issuances. There will, however be a combined total of $106 million available from state reimbursement for Red Line stations, a capital maintenance fund, and project financing.

Starting in 2009, PAYGO capital will increase each year, growing to a level of $432 million per year in 2025, and will be sufficient to replace the issuance of additional bonded indebtedness. For the total period of 2004 to 2025 covered by this Transportation Plan, PAYGO funding is estimated to contribute $3.096 billion to the capital program.

Between 2004 and 2015, additional state appropriations of $773 million are anticipated to cover costs of projects legally committed under the State Implementation Plan prior to the passage of the Forward Funding legislation. These include restoration of Green Line service to Arborway, the Red Line/Blue Line connector, extension of the Green Line to Medford Hillside, and construction of a ferry terminal at Russia Wharf. (Any or all of these projects are subject to substitution with projects of equal or greater air quality benefits.) Another $35 million is anticipated for improvements to the Fairmount commuter rail line and is currently included in a bill in front of the Legislature.

Table 4-5 provides a breakdown of the MBTA capital program by source. Based upon historic trends, the Boston Region MPO assumes in the Regional Transportation Plan that over time the capital maintenance needs of the MBTA service will consume at least

70% of all available capital revenues, (excluding those from the special state appropriations discussed above). This will leave a maximum of 30% (plus any special state appropriations) for capital expansion projects.

Table 4-5
Projected Funds Available for the MBTA Capital Program

	2004-2009	2010-2015	2016-2021	2022-2025	Total
Federal Aid - Non discretionary	$1,173,000,000	$994,000,000	$994,000,000	$662,000,000	$3,823,000,000
Federal Aid - discretionary	$209,000,000	$174,000,000	$491,000,000	$311,000,000	$1,185,000,000
Revenue Bonds	$1,422,000,000	$445,000,000	$0	$0	$1,867,000,000
PAYGO and Miscellaneous Funds	$129,000,000	$386,000,000	$1,225,000,000	$1,462,000,000	$3,202,000,000
State Appropriations/ Bonds	$279,000,000	$529,000,000	$0	$0	$808,000,000
Total Capital Funds	$3,212,000,000	$2,528,000,000	$2,710,000,000	$2,435,000,000	$10,885,000,000

MBTA capital maintenance needs include infrastructure projects, such as signals and track upgrades; system enhancement projects and accessibility projects, such as improvements necessary to comply with the Key Station Plan. Capital expansion projects, on the other hand, are projects that add new service to the system. The actual allocation of funds between capital maintenance and expansion projects, while limited to the 70/30 split over the long-term, may vary somewhat in each year.

Table 4-6 shows the level of funding available for the Maintenance and Improvement program and the Capacity program in six-year increments from 2004 to 2021, and a final four-year increment to 2025.

Table 4-6
Projections of the Use of Transit Capital Funds

	2004-2009	2010-2015	2016-2021	2022-2025	Total
MBTA Capital Funds	$3,212,000,000	$2,528,000,000	$2,710,000,000	$2,435,000,000	$10,885,000,000
Maintenance & Improvement Projects	$2,053,000,000	$1,399,000,000	$1,897,000,000	$1,705,000,000	$7,054,000,000
Transit Expansion Projects	$1,159,000,000	$1,129,000,000	$813,000,000	$730,000,000	$3,831,000,000

Note: Maintenance and improvement projects are assumed to account for 70% of capital funds, except that state appropriations/bonds are allocated 100% to expansion projects

CHAPTER 5: THE TRANSPORTATION PLAN

Background

This chapter outlines the guiding principles and policies used in the development of this Plan, the land use scenario used in the projection of future conditions, and the recommended list of projects that represents the Boston Region MPO's priorities to the year 2025, and the transportation model results of the recommended projects. It continues the work that was completed during the development of the 2000-2025 Plan Update, which was adopted in March of 2002.

Reinvestment in the existing system is the top priority of the Boston Region MPO. In this plan, the MPO has allocated 70% of future transit capital funding for system infrastructure maintenance, accessibility improvements and system enhancements. The remaining 30% is allocated to system expansion. Similarly, on the roadway side, this plan allocates 70% of future capital (non-Artery) highway funding to maintaining the existing infrastructure, while the remaining 30% is allocated to roadway expansion.

The Boston MPO's emphasis on reinvesting in the region's transportation infrastructure corresponds with the state's "Fix it First" policy, which was established for both highway and transit spending to ensure that current infrastructure is maintained and enhanced to best serve the public.

Because of the significant funding needed to maintain and enhance transportation in Eastern Massachusetts and throughout the Commonwealth, the Administration is working to establish an objective set of criteria to use in determining the best projects. This approach will help steer limited funding to those projects that most effectively advance the sustainable development goals of the state. As the Commonwealth has worked on these statewide criteria, the Boston MPO has developed its own objective system to use for the project selection process of the Plan.

Guiding Principles and Policies for the Plan

The 2004 Transportation Plan recognizes the diversity of transportation needs and issues throughout the Boston region and attempts to respond to them in a balanced manner. This Plan sets the policies, selects the regionally significant projects, and identifies the actions necessary to serve all modes of transportation for persons and freight in this metropolitan region and by so doing, attempts to address the issues of congestion and sprawl while supporting economic vitality and environmental justice.

While advocating a transportation system that adequately serves all modes of travel, the Plan recognizes that many people of the region are and will continue to be reliant on the automobile. Indeed, we expect both roadway congestion and the demand for transit to increase in the future. The Plan also recognizes that many possibilities exist to reduce our dependence on the single-occupant vehicle. Changing our land use practices is an example. The Plan also stresses the need to develop a transportation system that expands our choices for travel within the region.

Sprawling development is wasteful of limited infrastructure dollars and detrimental to the quality of life which is an essential component of our economic competitiveness. Consequently, this Plan is generally consistent with MetroPlan, the adopted land use plan for the Boston region and with the sustainable development principles of the Commonwealth.

The Plan also seeks to provide access to transportation services on an equitable basis across the region. This includes, but is not limited to, ensuring that low-income and minority communities have transportation options to travel to jobs and that transit-dependent residents can reach needed services.

Finally, the Plan recognizes that the transportation system plays a critical role in the continued economic health of the region. Many sectors of the regional economy depend heavily on the safe and efficient movement of goods and services by truck, rail, air, and water.

The following Boston Region MPO policies and strategies are applicable to all MPO activities, with particular emphasis on the Regional Transportation Plan, the Transportation Improvement Program, and the Unified Planning Work Program. Though numbered for reference purposes, the policies are not prioritized.

Policy 1: Promote transportation projects that support state, regional and local land use policies.
Integrating transportation and land use policies can result in more efficient use of the regional transportation system, bringing jobs, housing, shopping and services closer together, and reduce sprawl.
To accomplish this policy, the Boston Region MPO will:

A. Consider both existing development and densities and any adopted state, regional and local plans in transportation decision-making and seek to develop transportation plans that are consistent with them. Priority will be given to projects in areas identified in local and regional plans as being suitable for concentrated development.

B. Solicit the input of environmental, community, economic development and other appropriate agencies on MPO certification documents to promote the integration of transportation with these interests.
C. Consider the impact of transportation projects on existing and future land use.
D. Consider the appropriate use and maintenance of transportation rights-of-way to maximize public benefits.
E. Encourage transportation investments that support transit-oriented designs, and increased potential for walking and bicycling.

Policy 2: Improve safety and security for all transportation system users.
Travelers should be confident of a safe and secure trip. Safety can be enhanced through careful attention to design, redesign, and upgrading of facilities. Operational safety can be enhanced through timely and effective maintenance. To accomplish this, the Boston Region MPO will:

A. Support designs, projects, and programs that accommodate safe travel for all system users throughout the transportation network, regardless of mode. This includes designs that encourage bicyclists, motorists, transit riders and pedestrians to share the transportation network safely.
B. Work with state agencies and communities to support design concepts that ensure that consideration of operational efficiency as well as the comfort, safety and convenience of the motorist are balanced with the needs of the communities, the environment, pedestrians, and bicyclists.
C. Support maintenance and operations of system infrastructure to provide for safety.

Policy 3: Improve transportation mobility for people and freight.
Improved mobility requires access to the transportation system and the availability of safe, reliable, and convenient travel options so that users can choose the services that best fit their needs.
To accomplish this policy, the Boston Region MPO will:

A. Support projects that increase the availability of transportation options.
B. Encourage projects that reduce reliance on single-occupant vehicles.
C. Support projects and programs that improve transit service by making it faster, more reliable, and more convenient.
D. Support transit services, including water transit, that increase and complement connections among transit services and communities.
E. Assist agencies and communities in planning and implementing projects that provide safe and convenient bicycle and pedestrian

connections to transit routes, between activity centers, and across communities.

F. Support programs that improve reverse commute options.
G. Plan and support transportation system management projects and programs that improve the operation of existing services such as improved signal systems, bus rapid transit, bus lanes and traffic signal preemption, and incident management programs.
H. Encourage the use of new technology and programs, including highway and transit Intelligent Transportation System programs and bus rapid transit, to improve the operation of the transportation system as well as safety, and reduce congestion.
I. Support projects that expand transportation system capacity in areas that are identified as problems in the Boston Region Congestion Management System and as dictated by sound fiscal management. Transit capacity may be expanded by increasing service frequency, expanding vehicle capacity, or expanding the system. Highway capacity may be increased by improving interchanges or adding HOV lanes. Adding capacity by building general-purpose lanes should be considered only when no demonstrably better solution such as public transportation can be found.
J. Expand commuter rail parking where necessary and practical.

Policy 4: Minimize transportation-related pollution of the environment and promote energy conservation.

This plan recognizes that reduced reliance on single-occupant vehicles and use of alternative fuel vehicles promote long-term air quality, reduced energy consumption and natural resource protection.

To accomplish this policy, the Boston Region MPO will:

A. Place a priority on identifying and evaluating environmental impacts in the transportation planning process.
B. Encourage projects and programs that increase the use of low-polluting fuels and efficient engine technology in transit and highway vehicle fleets.
C. Encourage the design and construction of facilities that assure that materials used in operations and maintenance will not have detrimental impacts on soil and water, and will minimize light and noise pollution.
D. Encourage the design, construction, and operation of facilities and services that promote energy efficiency and air quality.
E. Plan and fund programs to reduce demand for transportation services and facilities, including ridesharing and employer-based congestion reduction programs.

Policy 5: Provide and improve connections among transportation modes.
This Transportation Plan promotes a multimodal, comprehensive approach to transportation, with the various modes complementing each other. Investment choices should be influenced by how an improvement to a single transportation mode can make the entire system work better.
To accomplish this policy, the Boston Region MPO will:

A. Work to improve coordination among the local, regional, and state jurisdictions that own and operate the region's transportation system to better provide for local and regional transportation needs.
B. Fund projects, such as vehicle and bicycle parking expansion, that provide additional capacity at intermodal facilities.
C. Support projects that facilitate ease of transfer between modes, including improved fare collection systems and transit pass programs, and encourage transit schedules that promote timely transfers between services.
D. Fund systems that provide intermodal information on incidents, alternative routes, parking availability, and transit schedules.
E. Support projects and programs that improve access to transportation facilities.

Policy 6: Provide a transportation system that is accessible to all people.
The transportation system should provide access to transportation options for all people regardless of physical limitation, economic status, age or ethnicity.
To accomplish this policy, the Boston Region MPO will:

A. Work with local, regional, and state jurisdictions to identify and assess structural and operational barriers to mobility for transportation disadvantaged populations and seek to address them through a comprehensive program of construction, maintenance and operational improvements.
B. Seek to provide better access for all to transportation throughout the region, including our youth and our elderly and disabled users.

Policy 7: Promote the equitable sharing of the transportation system's benefits and burdens.
All users and communities should be treated fairly in the provision of transportation services. They should not be inequitably burdened by impacts from transportation projects and they should be invited to participate in transportation decision-making.
To accomplish this policy, the Boston Region MPO will:

A. Adopt measures of Environmental Justice for the region.
B. Use these Environmental Justice measures as an evaluation tool in planning and programming.

C. Apply planning resources to the resolution of identified environmental justice issues.

Policy 8: Emphasize the preservation and modernization of the existing transportation system.

Past investment in transportation facilities in the Boston region has resulted in a system that people and businesses rely on every day. Protecting that investment by preserving and upgrading facilities and services that meet a demonstrated need is a top priority.

To accomplish this policy, the Boston Region MPO will:

A. Put priority on projects that maintain and modernize existing infrastructure.
B. Promote public ownership and use of existing rights-of-way necessary for transportation needs consistent with statutory authority or other obligations providing for disposition of property.

Policy 9: Promote public involvement in all phases of transportation planning and design.

All users of the transportation system should have a voice in the transportation planning process. Public participation will continue through the Regional Transportation Advisory Council (Advisory Council), the MPO's public advisory committee, and through other, complementary avenues.

To accomplish this policy, the Boston Region MPO will:

A. Adopt, in cooperation with the Advisory Council, a new MPO Public Participation Plan that provides all users of the transportation system with the opportunity to participate in the transportation planning process.
B. Use extensive and effective means to reach users, including meetings and various media, always presenting information in a clear, jargon-free format.
C. Work to simplify the project review process by: establishing review timelines and deadlines, providing updated status information regularly, and working with implementing agencies to ensure that all communities understand the process.
D. Continue to work with the Advisory Council in the development of all MPO documents, and support the Advisory Council's work of bringing the public's views to MPO decision-making.
E. Reach out to under-represented persons and groups to ensure that decisions are made through an open and participatory process.

Policy 10: Strengthen the economic opportunities in the Boston region through transportation investments specifically taking into account areas targeted for economic development by state, regional and local plans.
The transportation system is fundamental to and intertwined with economic activity.
To accomplish this policy, the Boston Region MPO will:

A. Put priority on transportation investments related to existing centers of economic activity; or to areas with adequate water and sewer infrastructure; or to areas targeted for economic development.
B. Coordinate available data on freight movements in the Boston region in order to inform MPO decisions on infrastructure investments.
C. Encourage development of a comprehensive plan for freight movement that includes an evaluation of freight infrastructure needs and access to intermodal facilities (air, road, rail, and water), and considers impacts on neighborhoods and the environment.

Policy 11: Support the preservation of community resources and character in the transportation planning process.
To accomplish this policy, the Boston Region MPO will:

A. Encourage and support transportation enhancement projects to preserve and improve the natural and built environment.
B. Support the use of traffic calming when appropriate.
C. Work with state agencies and communities to support design concepts for roads that balance the needs of users of the facilities with the function and character of surrounding land uses, including scenic roads and historic areas.

Policy 12: Efficiently and effectively secure and apply financial resources for the maintenance, modernization, and appropriate expansion of the regional transportation system.
The Boston Region MPO has an obligation to provide maximum transportation benefit from its available financial resources and to explore and identify innovative financing options for transportation projects.
To accomplish this policy, the Boston Region MPO will:

A. Work to identify and acquire new revenue for transportation.
B. Explore and identify innovative funding sources including revenue-sharing among communities and peak-period pricing.
C. Promote new public/private partnerships as a way to provide needed services.
D. Work with implementing agencies, communities and project proponents to identify and adopt policies, procedures and information systems to estimate and contain project costs.

Recommended Land Use Scenario

Federal regulations stipulate that the MPO planning process consider the consistency of transportation plans with long-term land use and development plans and projections. The MPO selected the Targeted Growth land use scenario for inclusion with the recommended projects for modeling for the conformity determination. This scenario, which is explained in Chapter 3 and Appendix E, is based on current zoning and MetroPlan, the region's adopted land use plan. Development allowed by current zoning is assumed to continue at its 20-year average trend until it reaches buildout or until the forecast demand for water and sewer capacity exceeds a community's ability to provide it. Additional development demand is then allocated to communities with remaining water and sewer capacity and, generally, with commuter rail and other transit services available. The reallocation pattern is consistent with existing and expected constraints on water and sewer capacity, as well as with MetroPlan's goal of promoting denser development in areas where infrastructure already exists.

Recommended List of Planned Expansion Projects

The 30% capacity program is available to fund the costs of projects currently underway and those that constitute the planned expansion of the transportation system. The following ongoing regionally significant projects are funded in the transportation plan:

- The Central Artery Project – the total budget for this project is approximately $14.5 billion and the costs funded under this transportation plan are $2.543 billion (includes the repayment of $1.5 billion in Grant Anticipation Notes). This project has differing opening dates for its various segments, including many that are already in service. The final completion of the project is scheduled for April 2005.
- The Silver Line, Phase 2 (South Boston Piers Transitway) – the total budget for the project is approximately $600.9 million and the remaining costs funded under this transportation plan are $120 million. The projected start of service is winter 2003/2004.
- Route 128 Additional Lanes (Randolph to Wellesley) – the total budget for this project is approximately $150.6 million and the remaining costs funded under this Plan are $134.3 million. The completion of this project is projected to be 2011.

After accounting for the costs of these ongoing projects, the remaining funds available in the 30% capacity program are dedicated to planned expansion

projects. An expansion project is any project that adds capacity to the existing system through the addition of a travel lane, the construction of an interchange, the construction of a commuter rail extension or transit line, or the procurement of additional (not replacement) public transportation vehicles. Table 5-1 lists the projects funded under the 30% capacity program.

During the development of this Transportation Plan, the MPO determined that there would be no "flexing" of funds from one mode to another and that funding would be segregated by use. Thus, highway funds are used to fund highway projects and public transportation funds are used to fund improvements to the regional public transportation system. Based upon this distinction, the 30% capacity program yields approximately $1.36 billion for non-Artery highway projects, including $134 million in funds allocated to the ongoing Route 128 project referenced above, and $2.8 billion for transit projects, including $120 million in funds allocated to the ongoing Silver Line Phase 2 project referenced above. The MPO has decided to use some transit funds to attempt to leverage an additional $1.181 billion* in New Starts Program funds beyond those currently assumed in the 30% capital program. Table 5-2, shows the total amount of funding dedicated to expansion projects in the Plan Update.

Table 5-1
Regionally Significant Projects in the Recommended Plan

Crosby Drive (Bedford)
Middlesex Turnpike (Bedford & Burlington)
Route 128 Capacity Improvements (Beverly to Peabody)
East Boston Haul Road/Chelsea Truck Route (Boston)
Arborway Restoration (Boston)
100 Additional Buses to Improve Service on Existing Routes
Red Line/Blue Line Connector (Boston)
Fairmount Line Improvements (Boston)
Route 1A/Boardman Street Grade Separation (Boston)
Russia Wharf Ferry Terminal (Boston)
Rutherford Avenue (Boston)
Silver Line Phase 3 (50/50) (Boston)
Old Colony/Greenbush Commuter Rail (Boston to Scituate)
Double Stack Initiative (Boston to Newton)
Green Line to West Medford (Boston, Medford & Somerville)
Urban Ring Phases I & 2 (Compact Communities)

* For the purposes of this Plan, the MPO has subjected the New Starts funds to the 70/30 split, thus the assumed Urban Ring and North Shore Transit Improvements New Starts funding translates into $240,000,000 as shown in Table 5-4.

Table 5-1 (cont.)

I-93/I-95 Interchange (Canton)
I-93 (NB)/Dedham Street Ramp (Canton)
Concord Rotary (Concord)
Route 2/Crosby's Corner (Concord and Lincoln)
Route 1/114 Corridor Improvements (Danvers & Peabody)
Telecom City Boulevard (Everett, Malden & Medford)
Revere Beach Parkway (Everett & Medford)
Route 126/135 Grade Separation (Framingham)
Route 9/Route 126 Interchange (Framingham)
Double Stack Initiative (Framingham to Worcester)
Route 53 (Hanover)
Route 53/228 (Hingham and Norwell)
Route 128 Capacity Improvements (Lynnfield to Reading)
Route 1 Improvements (Malden & Revere)
I-495/I-290/Route 85 Interchange (Marlborough)
Double Stack Initiative (Natick & Wellesley)
Needham Street/Highland Avenue (Newton & Needham)
Burgin Parkway (Quincy)
Quincy Center Concourse, Phase 2 (Quincy)
I-93/I-95 Initiative (Reading & Woburn)
Mahoney Circle Grade Separation (Revere)
Route 1/Route 16 Interchange (Revere)
Route 1A/Route 16 Connection (Revere)
North Shore Transit Improvements (Revere to Salem Corridor)
Boston Street (Salem)
Bridge Street (Salem)
Assembly Square Orange Line Station (Somerville)
I-93/Mystic Avenue Interchange (Somerville)
Naval Air Station Access Improvements (Weymouth)
Route 18 (Weymouth)
Route 3 South Additional Lanes (Weymouth to Duxbury)
I-93/Ballardvale Street Interchange (Wilmington)
I-93/Route 129 Interchange (Wilmington)
New Boston Street Bridge (Woburn)

Table 5-2
Funding Dedicated to Expansion Projects

The Central Artery Project	$2,543,000,000
Non-Artery Highway Projects (30% Capacity Program)	$1,394,000,000
Highway Subtotal	$3,937,000,000
Transit Projects (30% Capacity Program)	$2,783,000,000
Additional Federal Funds Assumed in 30% Capacity Program	$240,000,000
Additional State Funds Assumed in 30% Capacity Program	$808,000,000
Transit Subtotal	$3,831,000,000

The highway and transit projects funded under the 30% capacity program were selected for inclusion in the Plan based upon the professional judgment of the various MPO members after reviewing myriad sources of information, including:

- results from the regional travel demand model;
- information produced on projects through feasibility studies, project-specific modeling work, and environmental impact reports;
- a matrix examining each individual highway project for conformity with the MPO's transportation policies;
- recommendations and prioritizations of each individual transit project as set forth in the MBTA's *Program for Mass Transportation*;
- recommendations from the MPO's citizen advisory council and environmental justice committee;
- MPO member's personal knowledge of proposed projects; and
- feedback from the public outreach process.

Figure 5-1 shows the location of the planned expansion projects included in the 30% capacity program.

Highway Projects in the Recommended Plan
Table 5-3 lists the highway projects funded under the 30% capacity program, their costs, and when they are projected for construction. Pursuant to federal guidance, the costs associated with each highway project are based on the cost estimate in current dollars.

The next section of Chapter 5 provides a detailed description and map for each highway project included in the recommended Plan.

FIGURE 5-1
Expansion Projects in the Recommended Plan

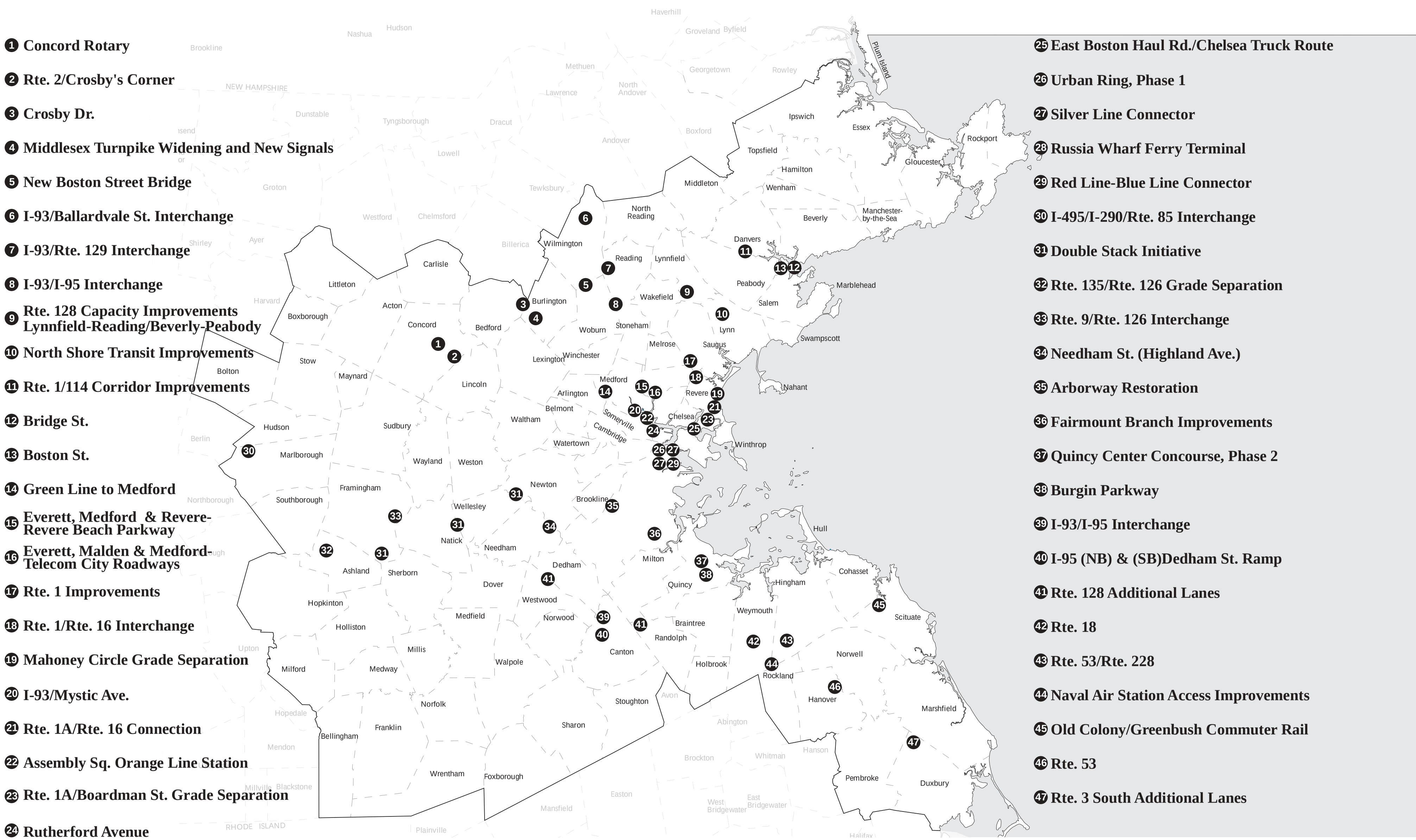


Table 5-3

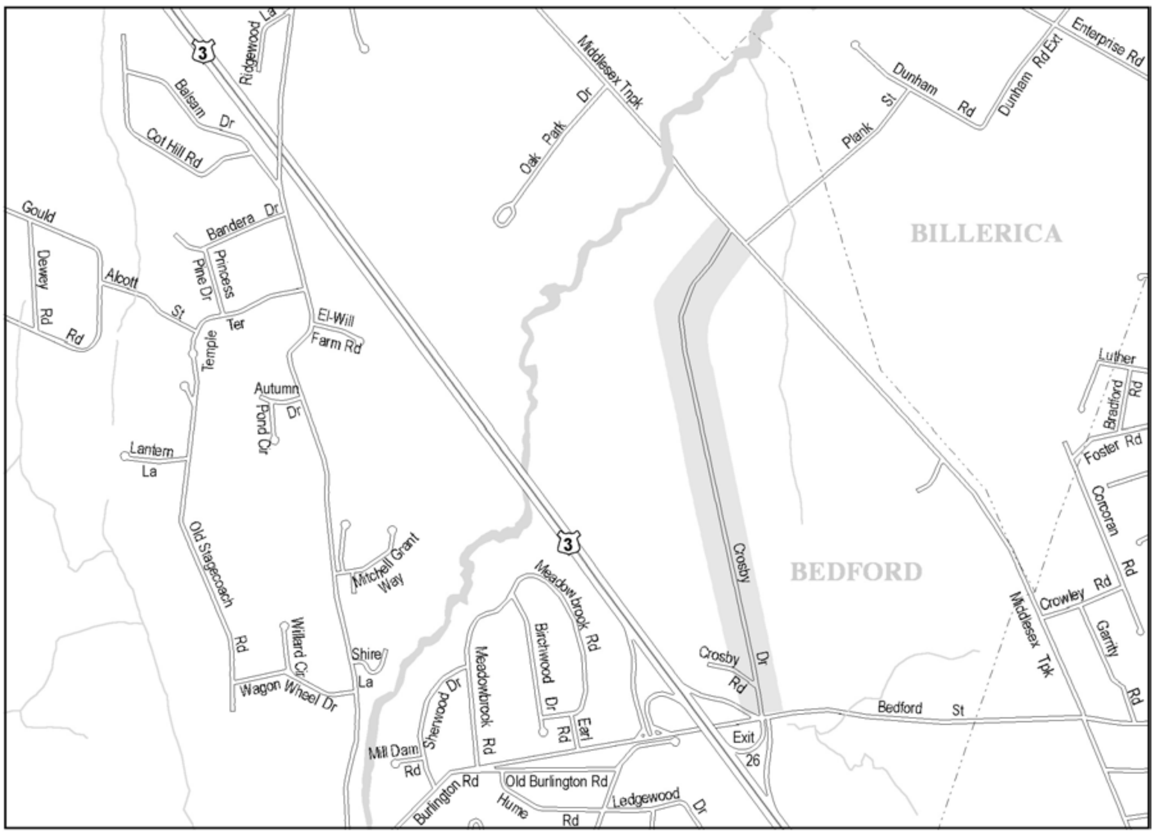
Regionally Significant Highway Projects in the Recommended Plan

Ongoing No-Build Projects	**Current Cost**	**2004-2009**	**2010-2015**	**2016-2025**	**Total**
Route 128 Additional Lanes (Randolph to Wellesley)	$134,265,000	$134,265,000	$0	$0	$134,265,000
Plan Update Recommended Projects	**Current Cost**	**2004-2009**	**2010-2015**	**2016-2025**	**Total**
Crosby Drive (Bedford)	$3,500,000	$3,500,000	$0	$0	$3,500,000
Middlesex Turnpike (Bedford & Burlington)	$12,500,000	$12,500,000	$0	$0	$12,500,000
Rte. 128 Capacity Improvements (Beverly to Peabody)	$60,000,000	$0	$0	$60,000,000	$60,000,000
East Boston Haul Road/Chelsea Truck Route (Boston)	$12,000,000	$0	$12,000,000	$0	$12,000,000
Route 1A/Boardman Street Grade Separation (Boston)	$8,500,000	$0	$0	$8,500,000	$8,500,000
Rutherford Avenue (Boston)	$67,800,000	$0	$0	$67,800,000	$67,800,000
Double Stack Initiative (Boston to Newton)*	$20,000,000	$20,000,000	$0	$0	$20,000,000
I-93/I-95 Interchange (Canton)	$27,500,000	$0	$27,500,000	$0	$27,500,000
I-95 (NB)/Dedham Street Ramp (Canton)	$3,000,000	$0	$3,000,000	$0	$3,000,000
Concord Rotary (Concord)	$15,000,000	$0	$0	$15,000,000	$15,000,000
Route 2/Crosby's Corner (Concord and Lincoln)	$15,000,000	$15,000,000	$0	$0	$15,000,000
Route 1/114 Corridor Improvements (Danvers & Peabody)	$40,000,000	$0	$0	$40,000,000	$40,000,000
Telecom City Boulevard (Everett, Malden & Medford)	$13,000,000	$13,000,000	$0	$0	$13,000,000
Revere Beach Parkway (Everett & Medford)	$80,000,000	$0	$0	$80,000,000	$80,000,000
Route 126/135 Grade Separation (Framingham)	$50,000,000	$0	$0	$50,000,000	$50,000,000
Rte. 9/Rte. 126 Interchange (Framingham)	$15,000,000	$0	$15,000,000	$0	$15,000,000
Double Stack Initiative (Framingham to Worcester)*	$8,000,000	$8,000,000	$0	$0	$8,000,000
Route 53 (Hanover)	$4,000,000	$0	$0	$4,000,000	$4,000,000
Route 53/228 (Hingham and Norwell)	$2,500,000	$2,500,000	$0	$0	$2,500,000
Rte. 128 Capacity Improvements (Lynnfield to Reading)	$50,000,000	$0	$0	$50,000,000	$50,000,000
Route 1 Improvements (Malden & Revere)	$33,600,000	$0	$0	$33,600,000	$33,600,000
I-495/I-290/Route 85 Interchange (Marlborough)	$28,000,000	$0	$0	$28,000,000	$28,000,000
Double Stack Initiative (Natick & Wellesley)*	$20,000,000	$20,000,000	$0	$0	$20,000,000
Needham Street/Highland Avenue (Newton & Needham)	$6,600,000	$0	$0	$6,600,000	$6,600,000
Burgin Parkway (Quincy)	$18,000,000	$0	$0	$18,000,000	$18,000,000
Quincy Center Concourse, Phase 2 (Quincy)	$6,000,000	$0	$6,000,000	$0	$6,000,000
I-93/I-95 Initiative (Reading & Woburn)	$25,000,000	$0	$0	$25,000,000	$25,000,000
Mahoney Circle Grade Separation (Revere)	$25,000,000	$0	$25,000,000	$0	$25,000,000
Route 1/Route 16 Interchange (Revere)	$3,900,000	$0	$3,900,000	$0	$3,900,000
Route 1A/Route 16 Connection (Revere)	$39,600,000	$0	$0	$39,600,000	$39,600,000
Boston Street (Salem)	$2,000,000	$0	$2,000,000	$0	$2,000,000
Bridge Street (Salem)	$3,000,000	$0	$3,000,000	$0	$3,000,000
I-93/Mystic Avenue Interchange (Somerville)	$50,000,000	$0	$0	$50,000,000	$50,000,000
Naval Air Station Access Improvements (Weymouth)	$74,700,000	$0	$74,700,000	$0	$74,700,000
Route 18 (Weymouth)	$16,000,000	$16,000,000	$0	$0	$16,000,000
Route 3 South Additional Lanes (Weymouth to Duxbury)	$180,000,000	$0	$79,200,000	$100,800,000	$180,000,000
I-93/Ballardvale Street Interchange (Wilmington)	$15,000,000	$0	$0	$15,000,000	$15,000,000
I-93/Route 129 Interchange (Wilmington)	$15,000,000	$0	$15,000,000	$0	$15,000,000
New Boston Street Bridge (Woburn)	$2,000,000	$0	$0	$2,000,000	$2,000,000
Subtotal Proposed Build Scenario	**$1,070,700,000**	**$94,500,000**	**$266,300,000**	**$693,900,000**	$1,054,700,000
20% Contingency		**$18,900,000**	**$53,260,000**	**$138,780,000**	$210,940,000
Total RTP Expansion (No-Build + Build + Contigency)	$1,204,965,000	$247,665,000	$319,560,000	$832,680,000	$1,399,905,000
RTP 30% Expansion Target		$183,000,000	$301,000,000	$874,000,000	$1,358,000,000
Assumed Funding under the Seaport Bond Bill		$57,600,000	$0	$0	$57,600,000
Surplus/Deficit		-$7,065,000	-$18,560,000	$41,320,000	$15,695,000

* Projects to be funded under the Seaport Bond Bill

BEDFORD: CROSBY DRIVE IMPROVEMENTS ($3,500,000)

Reconstruct Crosby Drive, widening it from one to two lanes in each direction with a shared center left-turn lane. The roadway cross section width will increase to 66 feet, the total right-of-way width to 80 feet. Each direction will consist of a 14-foot outside travel lane and a 12-foot inside lane, with a 14-foot shared turning lane. The north side of the roadway will have a 3-foot grass strip with a 5-foot sidewalk. The south side will have a 6-foot grass strip.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The project is located on the eastern side of Bedford near the Burlington and Billerica town lines. The area is zoned as industrial and consists mainly of commercial, industrial, and office developments. There are, however, some residential properties in the project area. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis,

the area is part of a Redevelopment District with absolute development constraints.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Currently the roadway is flanked by low-density office parks, some residential properties, and a few undeveloped parcels. The area is zoned for industrial park uses and is part of a redevelopment district in Bedford.
- Bedford is not state-designated as an economically distressed area/economic target area, but is in the process of applying.
- There are two brownfield sites (large sites that are available for infill development) adjacent to the corridor.
- There is no transit service in this corridor, but sidewalks will be built on one side of the expanded roadway to allow some pedestrian use.
- Redevelopment opportunities have been mentioned as a project benefit, and the zoning is in place to allow more intensive use, so most of the roadway capacity additions in the corridor could be used up as parcels are redeveloped.

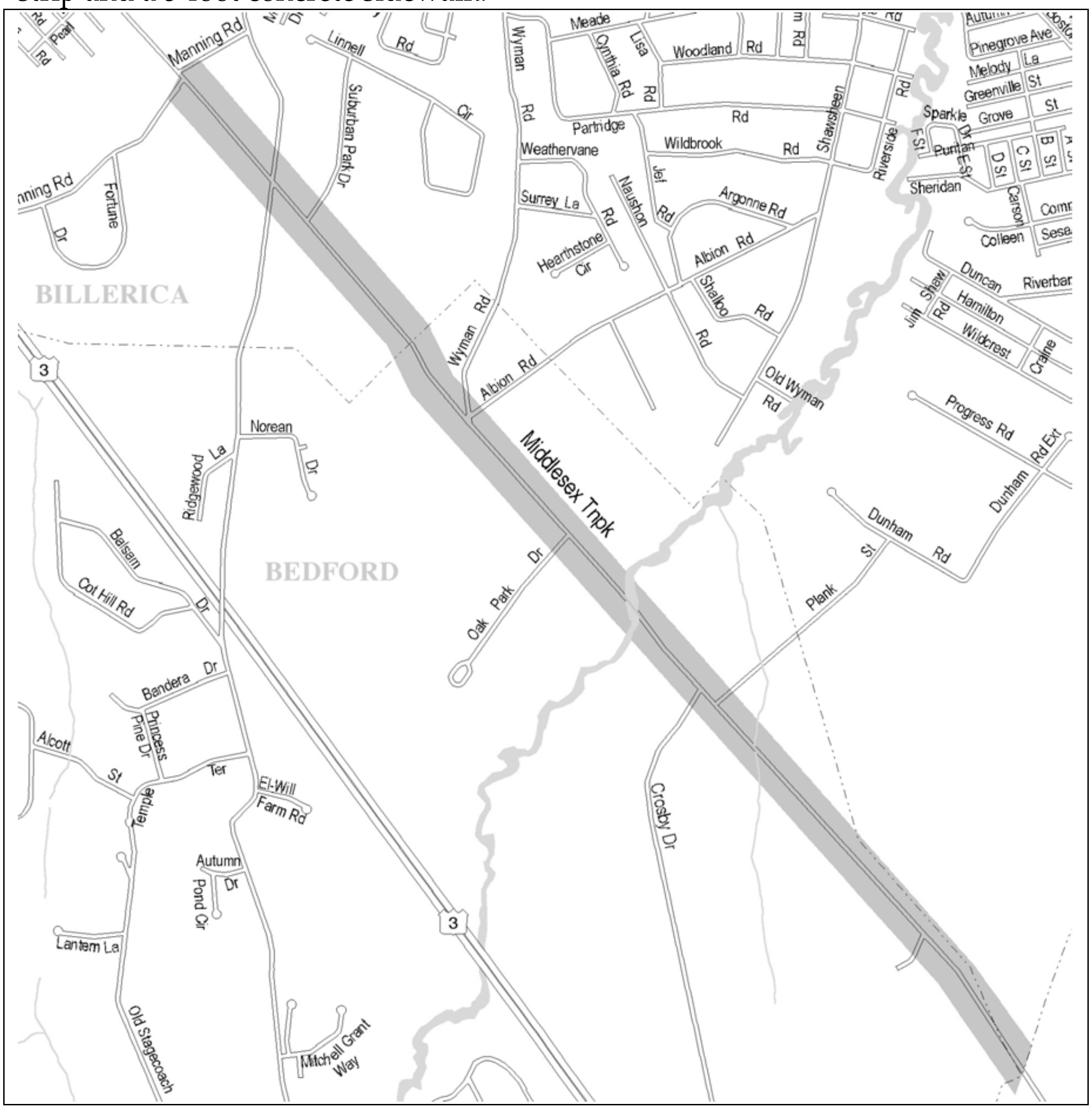
Safety
According to the draft environmental impact report (EIR) dated March 1997, the intersection of Crosby Drive and Middlesex Turnpike had an average of seven accidents per year between 1993 and 1995. The majority of the accidents were angle collisions in the peak hours.

Mobility
According to traffic counts conducted in 1995, the average daily traffic (ADT) on Crosby Drive west of the Middlesex Turnpike was 6,500 vehicles, while north of Route 62 it was 12,800 vehicles. A roadway segment capacity analysis done at that time showed that Crosby Drive operated at level of service (LOS) C in the AM and PM peak hours, while an intersection capacity analysis showed that the unsignalized intersection at the Middlesex Turnpike operated at LOS F in the AM and PM peak hours.

Economic Opportunities
According to the draft EIR, improving the capacity, efficiency, and safety of this roadway between the Middlesex Turnpike and Route 62 along with other roadways in the region will help improve the redevelopment opportunities of this area.

BEDFORD AND BILLERICA: MIDDLESEX TURNPIKE IMPROVEMENTS ($12,500,000)

The proposed improvements will widen the Middlesex Turnpike from the Burlington town line to just north of Manning Road in Billerica. The widening will provide two lanes in each direction, making it a four-lane highway with a median. There will be left- turn lanes at key intersections. The improvements span a segment of approximately 7.5 miles. The roadway cross section width will increase to 70 feet, and the total right-of-way will be 85 feet wide. Each direction will consist of a 14-foot outside travel lane, a 13-foot inside travel lane, and a 16-foot median. The median will be reconfigured at key intersections and driveways as a 4-foot median with a 12-foot protected left-turn lane. On the east side of the 70-foot travel way is a 7-foot grass strip, and on the west side are a 3-foot grass strip and a 5-foot concrete sidewalk.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
The project consists of a corridor that spans two communities, Bedford and Billerica. The area in Bedford is zoned for industrial park, industrial, general business, and residential uses. The area in Billerica is zoned for industrial uses. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the area in Bedford is part of a Redevelopment District and subject to partial development constraints. The area in Billerica is subject to absolute development constraints.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

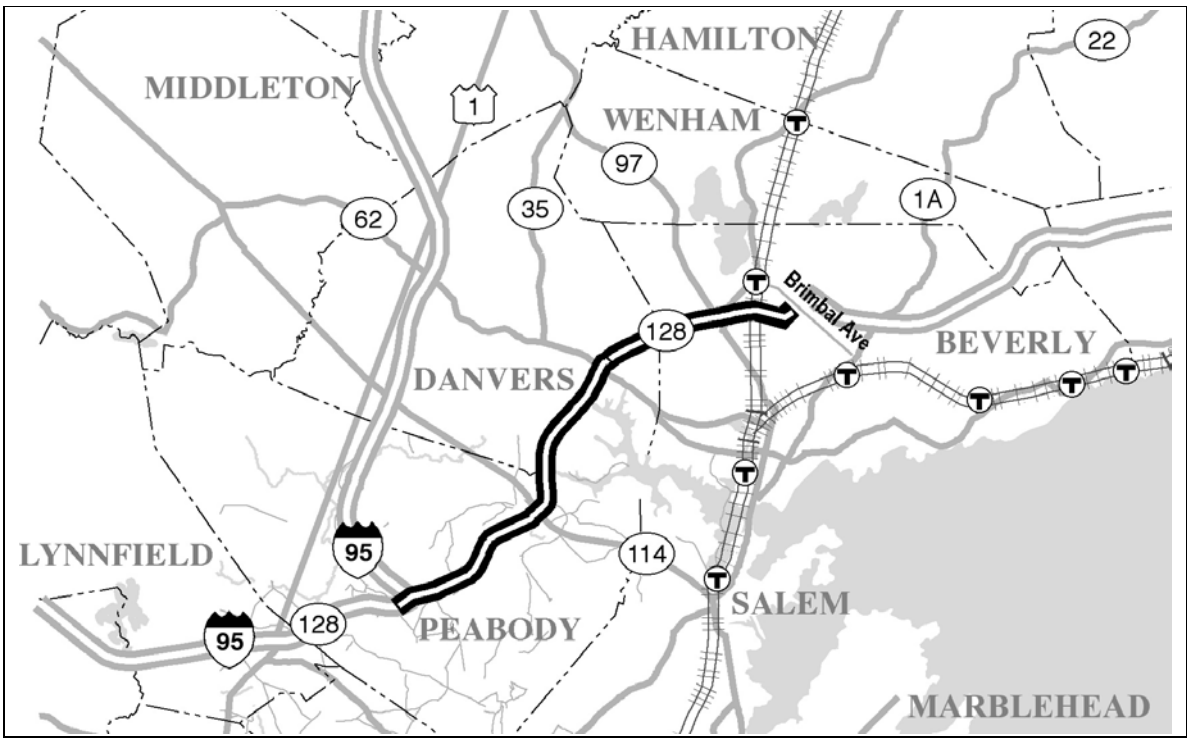
- Currently low-density residences, office parks, a hotel, a restaurant, and a few other commercial and industrial uses flank the roadway.
- The area in Bedford is part of a redevelopment district.
- Billerica and Burlington are state-designated as economically distressed areas/economic target areas. Bedford has not been designated, but is in the process of applying.
- There is one brownfield site (a large site that is available for infill development) near the project area. There are approximately 70 acres of developable land in the industrial/business zones in Bedford.
- There is no transit service in this corridor, but sidewalks will be built on one side of the expanded roadway to allow some pedestrian use.
- The zoning is in place to allow more intensive use in the project area, so most of the roadway capacity additions in the corridor could be used up as parcels are redeveloped.

Mobility
According to MassHighway traffic counts conducted in 2000, the average daily traffic on the Middlesex Turnpike at the Bedford town line was 15,000 vehicles. According to the draft environmental impact report (DEIR) done in 1995, a Roadway Segment Capacity Analysis showed that the Middlesex Turnpike operated at a level of service (LOS) E in the AM and PM peak hours and that at six out of seven intersections along the turnpike, the critical movement in the AM and PM peak hours operated at LOS F. In terms of delay, the Congestion Management System monitoring conducted in 2002 found that the average travel speed is below 70% of the posted speed along four segments in both the northbound and southbound directions, in both the AM and PM peak periods.

Economic Opportunities
According to the DEIR, improving the capacity, efficiency, and safety of this roadway will help improve the redevelopment opportunities of this area.

BEVERLY TO PEABODY: ROUTE 128 CAPACITY IMPROVEMENTS ($60,000,000)

This project will address safety problems, congestion, and traffic flow on Route 128 from Interstate 95 in Peabody to Brimbal Avenue in Beverly. The initial stage of the project will be a detailed evaluation of all alternatives for moving additional persons in the corridor. Because of existing safety problems, implementation of improvements may be phased to address more immediate concerns first.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
Zoning along this stretch of Route 128 includes residential, industrial, and business uses in the three communities of Peabody, Danvers, and Beverly. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the majority of the land in the project area is subject to absolute development constraints. Each of the communities does have various parcels of developable land along the Route 128 corridor.

Safety

This project area includes eight high-crash locations, as documented between 1997 and 1999—Route 128/Lowell Street, Route 128/Route 114, and Route 128/I-95 in Peabody; Route 128/Endicott Street, Route 128/Route 35, and Route 128/Route 62 in Danvers; and Route 128/Route 1A and Route 128/Brimball Avenue in Beverly.

Peabody:

- Route 128/Lowell Street intersection was the site of 213 crashes, of which 131 involved property damage and 82 involved bodily injury. It ranked #40* on the list of the state's high-crash intersections.
- Route 128/Route 114 intersection was the site of 191 crashes, of which 112 involved property damage and 79 involved bodily injury. It ranked #47* on the list of the state's high-crash intersections.
- Route 128/I-95 intersection was the site of 86 crashes, of which 51 involved property damage, 34 involved bodily injury, and 1 resulted in a fatality. It ranked #186* on the list of the state's high-crash intersections.

Danvers:

- Route 128/Endicott Street intersection was the site of 176 crashes, of which 107 involved property damage and 69 involved bodily injury. It ranked #55* on the list of the state's high-crash intersections.
- Route 128/Route 35 intersection was the site of 127 crashes, of which 77 involved property damage, 49 involved bodily injury, and 1 resulted in a fatality. It ranked #91* on the list of the state's high-crash intersections.
- Route 128/Route 62 intersection was the site of 125 crashes, of which 82 involved property damage and 43 involved bodily injury. It ranked #112* on the list of the state's high-crash intersections.

Beverly:

- Route 128/Route 1A intersection was the site of 81 crashes, of which 49 involved property damage and 32 involved bodily injury. It ranked 226* on the list of the state's high-crash intersections.
- Route 128/Brimball Avenue intersection was the site of 76 crashes, of which 43 involved property damage and 33 involved bodily injury. It ranked #227* on the list of the state's high-crash intersections.

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* The MPO safety ranking of this intersection is different from the official MassHighway ranking due to a different numbering system.

Mobility

According to MassHighway traffic counts, the average daily traffic on Route 128 along this stretch of roadway is as follows:

Peabody:

North of I-95 (1998 counts) – 97,500 vehicles

Danvers:

North of Endicott Street (2001 counts) – 79,500 vehicles

Beverly:

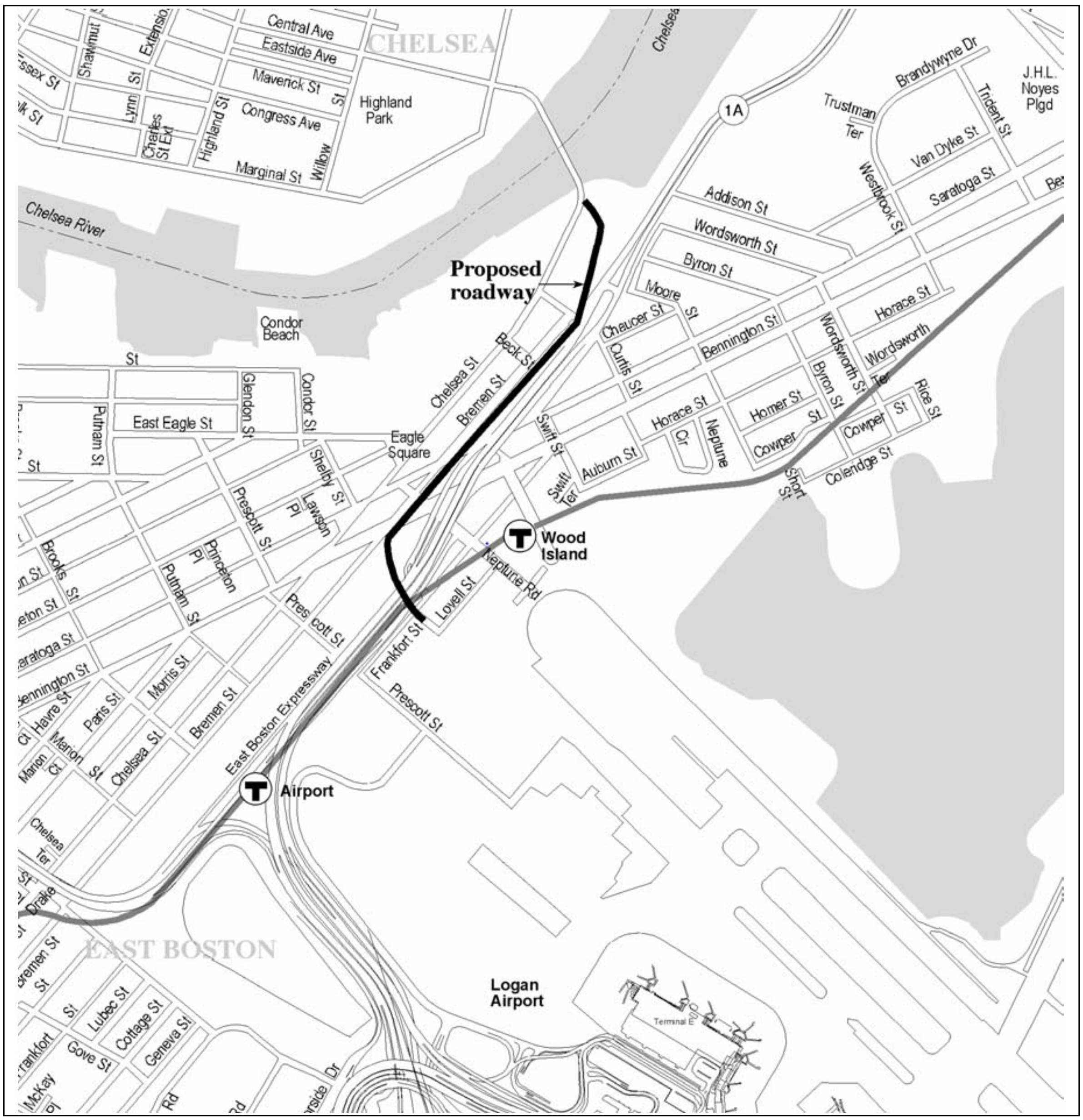
At Danvers Town Line (2001 counts) – 80,600 vehicles

North of Brimball Avenue (2001 counts) – 48,800 vehicles

According to the CTPS memorandum, *Potential Long-Range Plans for Improving Express Highway in the Boston Metropolitan Region*, dated December 27, 2000, this section of Route 128 is oldest remaining original construction on Route 128. The combination of poor design standards and high volumes makes this a dangerous stretch of roadway to drive.

BOSTON: EAST BOSTON HAUL ROAD/CHELSEA TRUCK ROUTE ($12,000,000)

Construct a bypass road, utilizing an unused CSX rail right-of-way, that will be an exclusive truck route from Frankfort Street to the Chelsea Street Bridge. The proposed road will run under the Frankfort Street down-ramp and McClellan Highway (Route 1A) overpass, turn right under Neptune Road in the CSX right-of-way between Bremen and Saratoga Streets, pass under the Curtis Street overpass, and connect to Chelsea Street south of the Chelsea Street Bridge. The bypass road will cross over the MBTA's Blue Line tunnel at the intersection of Frankfort and Lovell Streets. This bypass road will be designed for use by Logan air cargo industry freight trucks, rental cars, Park n' Fly buses, and MBTA buses.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
The project area includes five zoning districts—residential, neighborhood business, waterfront (includes maritime economy reserve and manufacturing), corridor enhancement (promotes activities such as commercial uses to serve as a buffer between residential and industrial uses), and Logan Airport. The land use surrounding the northern end of the proposed road is primarily industrial, while around the southern end it is predominantly commercial (with a few residential areas). The project will incorporate a connection to the proposed East Boston Greenway, a 3.5-mile greenbelt connecting East Boston Piers Park at Jeffries Point with the Belle Isle Marsh Conservation facility at Orient Heights.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- This project is an alternative to the Route 1A/Chelsea Street Bridge Connection project, also providing a more direct connection and removing trucks from residential neighborhoods. Trucks currently use the Chelsea Street Bridge and cut through the residential neighborhoods in East Boston to access Logan Airport, the oil tank farms, and the produce distribution centers in Chelsea.
- There are mostly residential uses south of the site, with an oil tank farm just south of the bridge and other industrial uses nearby. This project would have a positive benefit on the residential neighborhoods, since it redirects trucks away from local streets.
- Boston is state-designated as an economically distressed area/economic target area.
- There are several brownfield sites (large sites that are available for infill development) nearby.

Mobility
MassHighway traffic counts performed in 1997 showed average daily traffic of 21,800 vehicles on the Chelsea Street Bridge and 31,600 vehicles on Route 1A at the Logan Airport ramps. According to the East Boston/Chelsea Truck Route Concept Study dated June 1998, this project will improve mobility through a dedicated route for freight vehicles, rental cars, and buses that will bypass neighborhood traffic in East Boston and provide a direct link between Chelsea and Logan Airport.

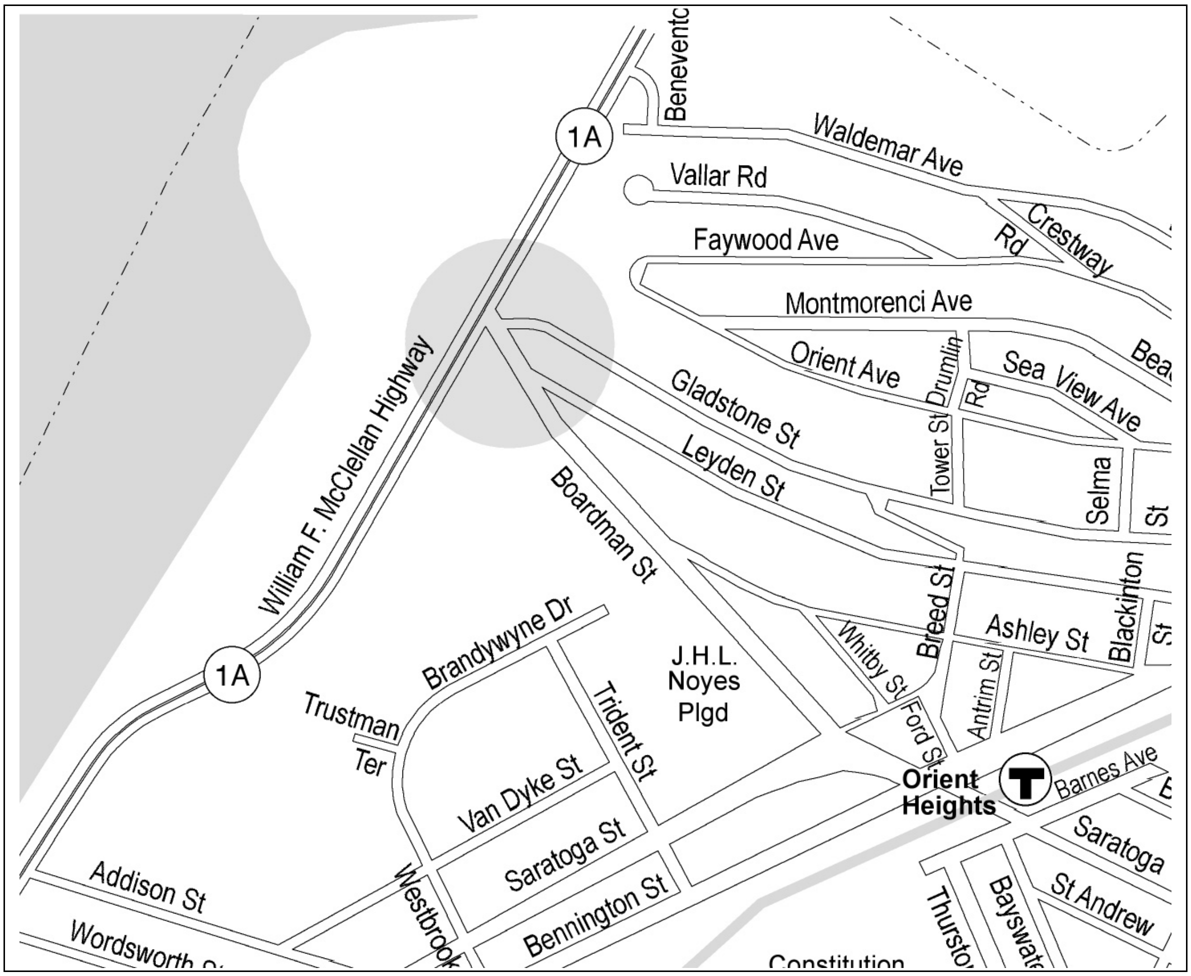
Connectivity
The bypass road will provide freight vehicles, rental cars, Park n' Fly buses, and MBTA buses with a direct connection to Logan Airport's passenger and freight terminals, resulting in enhanced connections between the airport and communities north of Boston. In addition, the proposed Urban Ring project (included in the 2000 Boston Regional Transportation Plan) could potentially utilize this bypass road.

Sharing of Benefits/Burdens
According to the East Boston/Chelsea Truck Route Concept Study, the project's positive implications for the cargo industry are matched by its benefits for the local and regional community. Benefits include reducing traffic on local and neighborhood streets through the dedicated freight-haul road and providing a pedestrian connection to the proposed East Boston Greenway. Burdens include a 24-hour operating freight-haul route that will operate within 500 feet of some residential areas in East Boston.

Economic Opportunities
East Boston is situated between Logan Airport, a key player in New England's freight truck transportation network, and the city of Chelsea's Airport Overlay District. According to the East Boston/Chelsea Truck Route Concept Study, this new connection will enhance the efficiency and accessibility of commercial vehicle travel between Logan and Chelsea by eliminating a major truck traffic bottleneck.

BOSTON: ROUTE 1A/BOARDMAN STREET GRADE SEPARATION
($8,5000,000)

Construct an overpass with ramps to replace the existing signalized intersection of Route 1A and Boardman Street. Boardman Street will be relocated approximately 400 feet south of its current location and Route 1A traffic will pass over Boardman Street, with connections provided via on- and off-ramps.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

Boardman Street provides access to the Orient Heights residential neighborhood from Route 1A. Other surrounding land uses include the Suffolk Downs Racetrack (a possible future redevelopment site) to the north and Logan Airport and its associated uses, such as parking lots for passengers and rental cars, gas stations, and a hotel, to the south.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- The existing zoning in the project area is waterfront, residential, and industrial.
- Brownfield sites (large sites that are available for infill development) are located close to the project area.
- The city of Boston is state-designated as an economically distressed area/economic target area.
- The proposed project will not significantly improve access to adjacent uses, but is designed to speed travel north and south of the intersection.

Safety

This project is located at a high-crash location: between 1997 and 1999, the Route 1A/Boardman Street intersection was the site of 55 crashes, of which 23 involved property damage and 32 involved bodily injury. It ranked #298[1] in the list of the state's high-crash intersections.

Mobility

MassHighway traffic counts conducted in 2000 show that the average daily traffic along Route 1A at the Boston/Revere city line was 51,850 vehicles. According to the Route 1A Corridor Planning Study prepared by CTPS in 1990, the signalized intersection of Boardman Street and Route 1A was operating at level of service (LOS) D in the AM peak hour and LOS F in the PM peak hour. The Route 1A/Boardman Street intersection was ranked the worst intersection along Route 1A (tied with Route 1A/Mahoney Circle intersection). The corridor study indicated that a grade-separated interchange of Boardman Street and Route 1A would produce acceptable operating conditions.

Pollution

The improved flow of traffic at the Boardman Street grade separation will provide air quality benefits by reducing "hot spot" emissions through a reduction in vehicle idling and associated emissions.

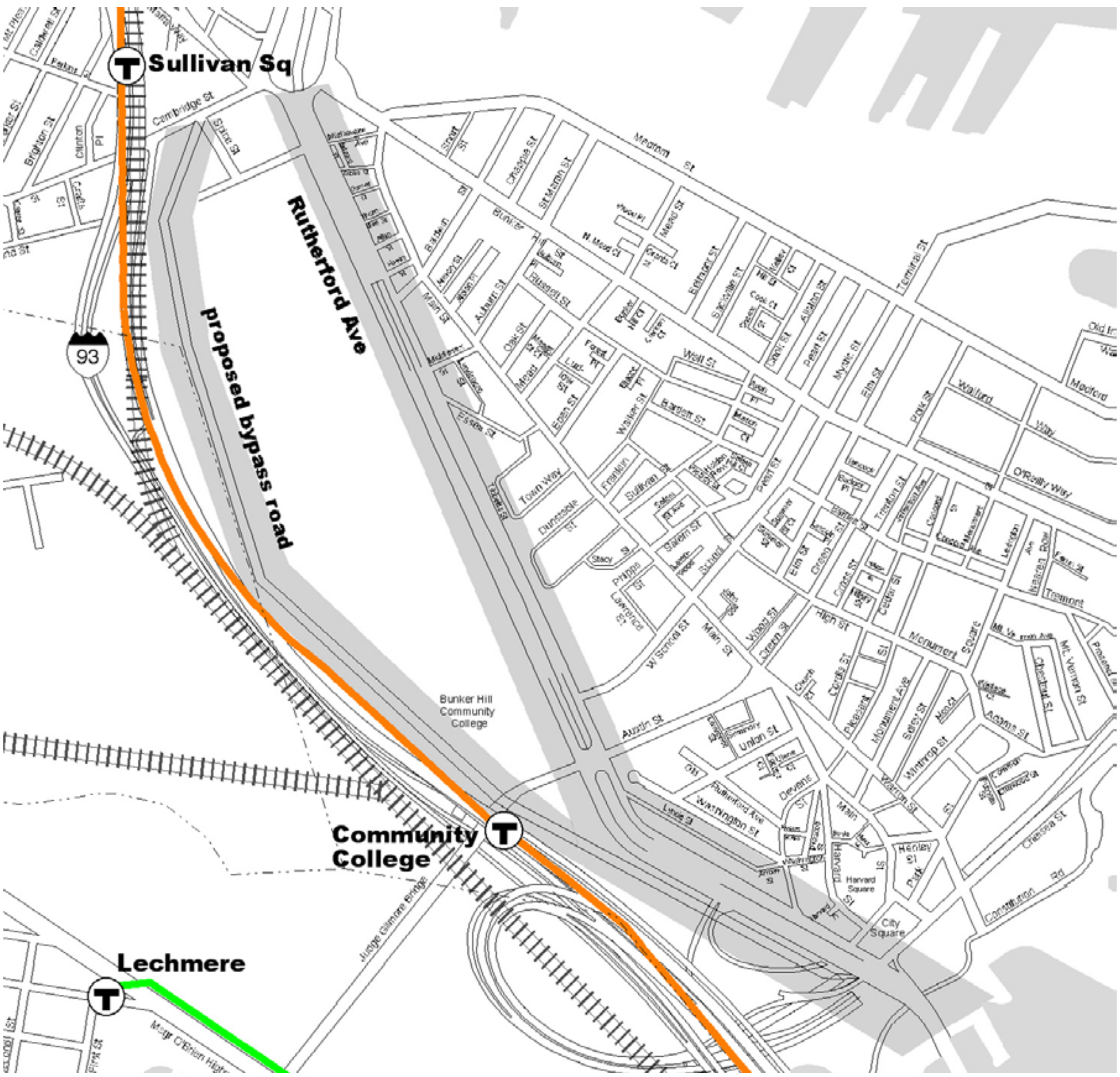
[1] The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

BOSTON: RUTHERFORD AVENUE ($67,800,000)

The Rutherford Avenue Corridor Transportation Study (a cooperative effort between MassHighway and the city of Boston) contains a design to reconstruct Rutherford Avenue consisting of two components:

- A new four-lane bypass road adjacent to the Interstate 93 viaduct for traffic diverted from City Square, with underpasses at the Gilmore Bridge and at Cambridge Street at Sullivan Square, and
- A four-lane roadway for local Charlestown traffic

The project includes a redesigned Sullivan Square to accommodate the bypass road connection to Route 99.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
Rutherford Avenue was built prior to the interstate system and was the historic connection to cities and towns north of Boston. Today it remains an important path into the city, and it has been used as a major alternative route during the construction of the Central Artery. Rutherford Avenue parallels the elevated Interstate 93 to its west; to its east is the neighborhood of Charlestown. It provides access to tourist areas, including the USS *Constitution* and the Freedom Trail. Thus, there is a large amount of pedestrian travel in the vicinity. In addition, a new park has been built on the west side of the roadway as part of the open-space mitigation measures for the Central Artery/Tunnel Project. The Rutherford Avenue project will divert regional traffic to a new bypass road and create a local access roadway to benefit pedestrians and create more open space.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:
- Existing land uses on the east side of the corridor are mostly high-density residential, with some office uses at the former Schrafft's Building. Bunker Hill Community College is to the west, along with some industrial uses.
- Boston is state-designated as an economically distressed area/economic target area.
- There are several brownfield sites (large sites that are available for infill development) close to the project area.
- The area is zoned residential to the northeast of Rutherford Avenue and business, residential, and open space to the southwest.
- A new four-lane road is proposed adjacent to Interstate 93 to remove regional traffic from Rutherford Avenue.
- The Orange Line stations at Sullivan Square and Community College serve the corridor.
- By creating a local access road for Charlestown, the project will benefit pedestrians and create more open space. It should also help knit Charlestown together and make non-auto access between Charlestown and the rest of the region easier. Redevelopment of the western parcels to business uses is allowed under existing zoning, so the mix of uses in the area may not change much without changes in zoning.

Mobility
This project divides Rutherford Avenue into two roadways separating regional from local traffic. This action will maintain a total of eight lanes through the project area. MassHighway conducted traffic counts on Rutherford south of the Route 99 rotary in 1995. At that time the average daily traffic was 44,000 vehicles.

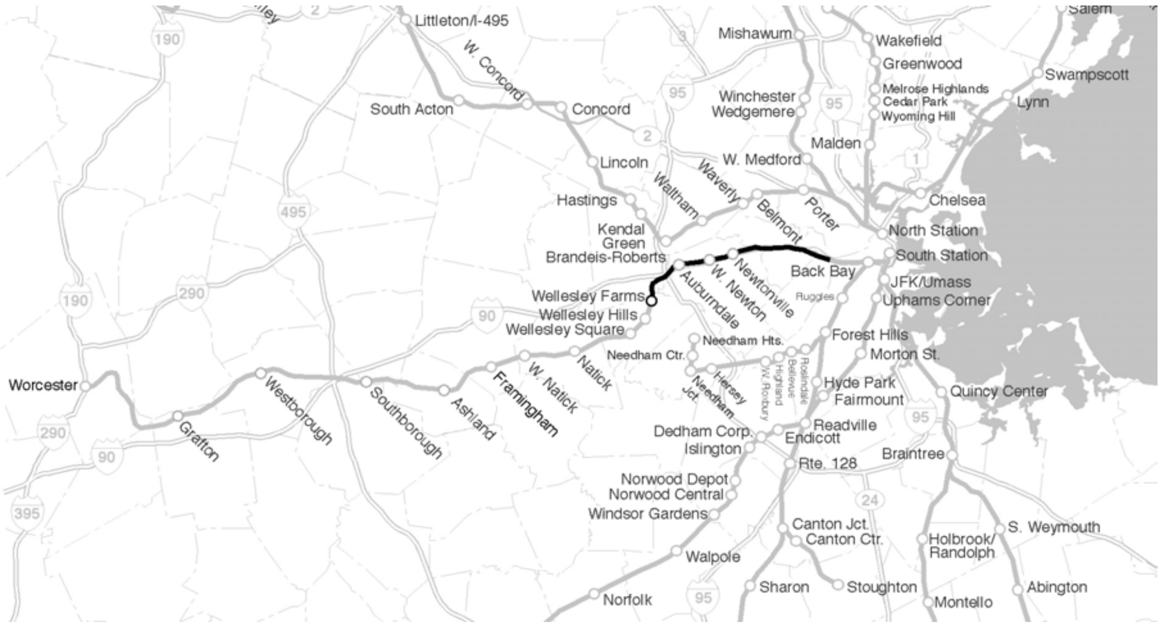
Connectivity
The Sullivan Square and Community College Orange Line Stations are located in the project area. Rutherford Avenue has been designated as an Urban Ring Phase II route in the MBTA's draft environmental impact report, based on the roadway's anticipated reconstruction.

Community Character
According to the Rutherford Avenue Study (see the note below), there are three main urban design goals associated with this project:
- Improve vehicular and pedestrian comfort and amenities
- Integrate the Rutherford Avenue corridor into the Charlestown neighborhood with new blocks and streets
- Increase the amount of green space and usable open space along the corridor

Note
A study of the Rutherford Avenue corridor was done as part of mitigation for the Central Artery/Tunnel Project. The study recommended near- and long-term improvements to Rutherford Avenue and Sullivan Square that would enhance the corridor as part of the regional roadway network and improve its integration into the abutting residential neighborhood. The plan recommended:
- Modifications to the Sullivan Square grade separations to connect the bypass road to Route 99 and improve access to transit and pedestrian travel
- Creating a four-lane bypass road with underpasses and a four-lane neighborhood access road.
- New bicycle and pedestrian facilities
- Creating new parcels for development

BOSTON TO NEWTON: DOUBLE-STACK INITIATIVE ($20,000,000)

All bridges crossing over the CSX rail line from Beacon Yards to Route 128 will be raised to accommodate double-stack freight trains.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
There will be no changes in land use as a result of this project; the rail line is currently operating through the project area.

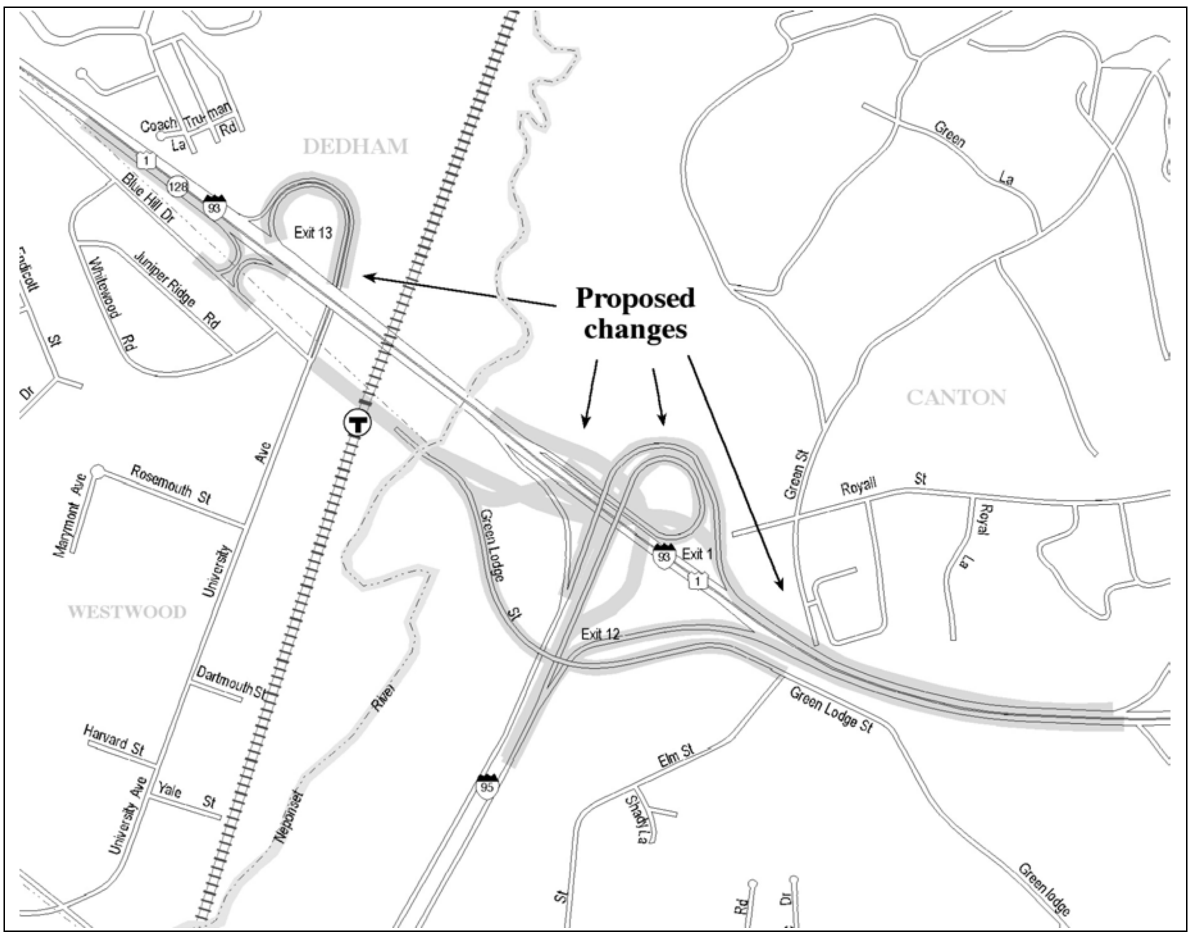
Mobility
This project will improve the capacity and operations of an existing freight facility. Benefits could include the reduction of truck traffic related to the movement of goods from the Port of Boston.

Connectivity
This project will improve rail access to Boston and will make the port more attractive in the highly competitive sea freight market. Its benefits include a probable increase in freight business for the port.

CANTON: INTERSTATE 95/INTERSTATE 93 INTERCHANGE ($27,500,000)

Specific components of the Interstate 95/Interstate 93 interchange project are:

- Replacement of the I-95 northbound entrance ramp with a direct connector ramp
- Construction of a new entrance ramp from University Avenue to I-93 northbound, including the discontinuance of the Green Lodge Street Bridge west of Elm Street
- Construction of a realigned, two-lane direct connection between Route I-93 southbound and I-95 southbound, including a new ramp to Blue Hill Drive
- Construction of a realigned, two-lane, direct connection from I-95 northbound to I-93 northbound



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
The 37 acres encompassed by this project are located entirely within the Fowl Meadow/Ponkapoag Bog Area of Critical Environmental Concern. Much of the land surrounding the interchanges is permanently protected, although some of it is zoned for single residences and light industry. According to the Environmental Notification Form (ENF) that was submitted to the Department of Environmental Protection, the project, as proposed, will decrease roadways and other paved areas by 1.7 acres.

Safety
This project is located at a high-crash location: between 1997 and 1999, I-93 at I-95 was the site of 295 crashes, of which 174 involved property damage and 121 involved bodily injury. It ranked #11 on the list of the state's high-crash intersections. There are recurring safety problems, including numerous truck rollovers on the I-95 northbound ramp.

Mobility
The ENF identifies chronic congestion in the project area in both the morning and afternoon peak periods, with the roadways and the interchanges frequently functioning at level of service F. Severe congestion at the intersection of University Avenue and Blue Hill Drive causes long queues that occasionally extend beyond the I-95 southbound exit ramp to Blue Hill Drive. Data collected in 1997 show that there were 150,000 vehicle trips per day on the I-95 section of the project and 170,000 trips on the I-93 section.

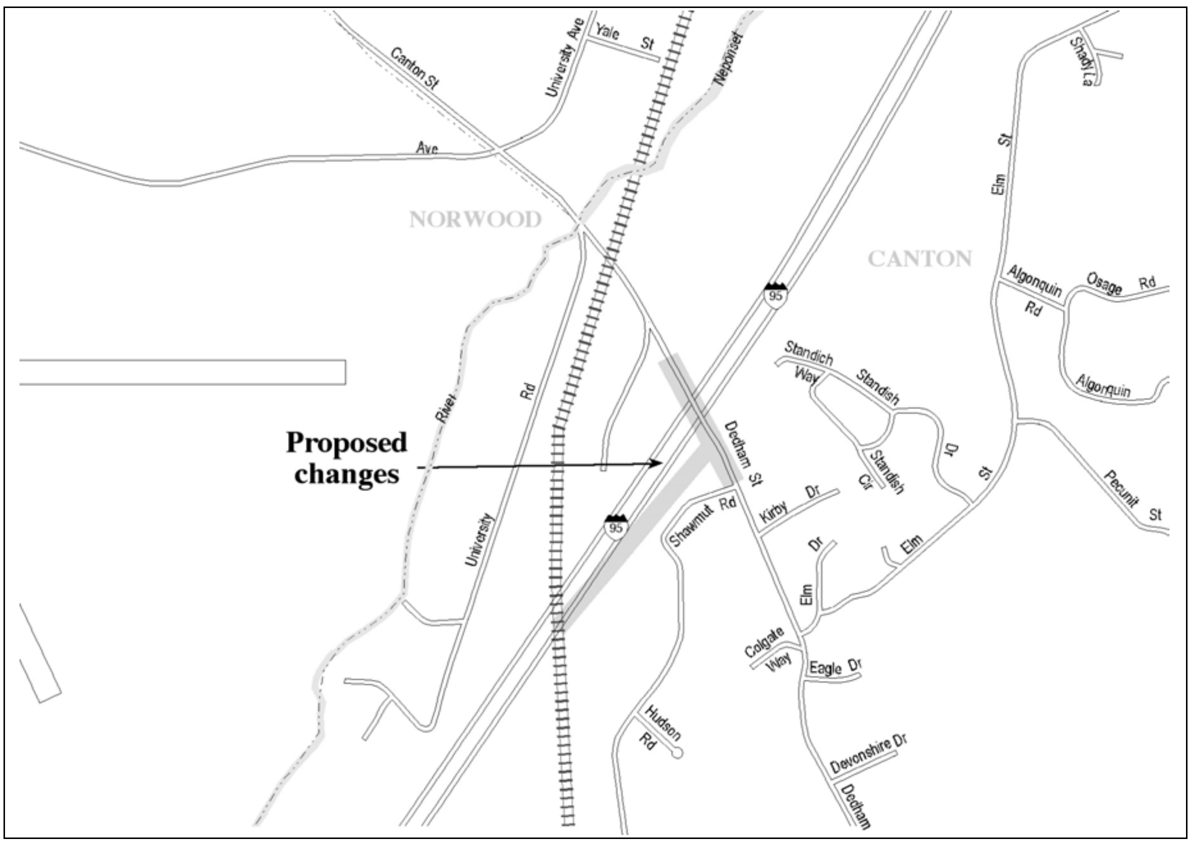
Connectivity
By reducing congestion and travel times, this project will enhance the attractiveness of Amtrak and MBTA commuter rail services at the Route 128 Station, as well as shuttle bus services connecting the station to residential and business centers in the area. The project will also facilitate greater recreational use of the Blue Hill Reservation trail system that runs through the area.

Note
This project implements the recommendations of the University Avenue / I-95/I-93 Regional Traffic Study that was prepared by the Central Transportation Planning Staff in July 1999. It is also consistent with the Canton, Dedham, Norwood, and Westwood Municipal Growth Planning Study.

The environmental impact report currently underway includes the Dedham Street/I-95 Northbound Ramp project (see separate project description). The projects are presented separately in order to show the areas in greater detail.

Canton: Interstate 95 Northbound/Dedham Street Ramp and Bridge ($3,000,000)

Construct a new ramp from Interstate 95 northbound to Dedham Street in Canton and widen Dedham Street over I-95. This will complement the benefits of the recently completed construction of the Dedham Street/I-95 southbound ramp by providing direct access to the town of Canton and the town of Westwood's University Avenue industrial area. Although this project is considered part of the Canton/Westwood I-95/ I-93/University Avenue project, it is presented separately in order to show the area in greater detail (see Canton: Interstate 93/Interstate 95 Interchange project).



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

This project is located in the Fowl Meadow /Ponkapoag Bog Area of Critical Environmental Concern. Adjacent land is zoned for light industry and single-family residences.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- The project will provide direct access to Dedham Street and University Avenue, areas currently developed with office and industrial uses.
- The town of Canton is state-designated as an economically distressed area/economic target area.
- The project is expected to have economic development benefits. The zoning will allow an increase in density upon redevelopment/new development.
- The project will improve access to the Route 128 commuter rail station from the south, which could result in the development of ancillary services at the station if use of the station increases.
- The amount of new development/redevelopment allowed under existing zoning could use up most of the increased access to the area that the new ramp will provide.

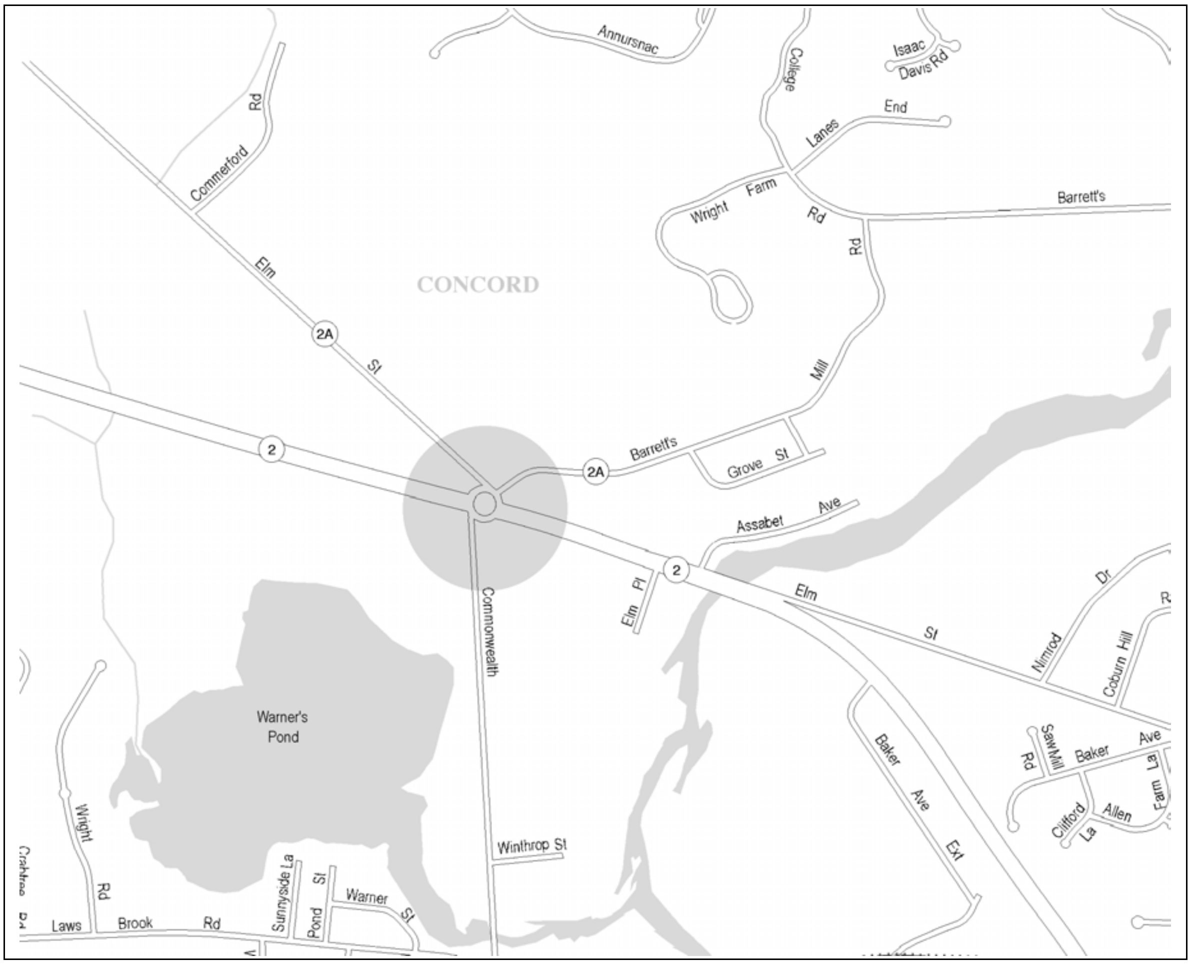
Mobility
This project will benefit local streets in the area by enabling I-95 northbound traffic destined for the University Avenue area to avoid local residential streets without increasing through traffic on Dedham Street. Users of the upper University Avenue/Blue Hill Drive area will also benefit.

Connectivity
By reducing congestion and travel times, this project will enhance the attractiveness of Amtrak and MBTA commuter rail services at the Route 128 Station, as well as shuttle bus services connecting the station to residential and business centers in the area.

Note
This project implements the recommendations of the University Avenue / I-95/I-93 Regional Traffic Study that was prepared the Central Transportation Planning Staff in July 1999. It is also consistent with the Canton, Dedham, Norwood and Westwood Municipal Growth Planning Study.

CONCORD: CONCORD ROTARY/ROUTE 2 ($15,000,000)

This proposed project will remove the rotary at the intersection of Route 2, Route 2A, Barrett's Mill Road, and Commonwealth Avenue in Concord. On the basis of a February 2003 feasibility study, three design alternatives are progressing: a full diamond interchange, a half diamond interchange on the north side of Route 2 with a quarter cloverleaf in the south quadrangle, and a quarter cloverleaf in the south quadrangle with ramps further north on Route 2. Each alternative includes grade separation of Route 2 from Route 2A and the local roads.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The project area in Concord is zoned mainly for residential, limited business, and some industrial uses. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis for Concord, the

land adjacent to Route 2 in the area has development constraints and limited future developable land.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- MCI Concord prison is located east of the rotary; open farmland and the Massachusetts State police office and horse farm are located to the west. Northwest of the rotary zoning is mostly residential, in 80,000 and 40,000 square foot lots, while residential zoning southwest of the rotary requires only 20,000 sq. ft lots. To the east zoning is primarily industrial park (with 60% three-story office and 40% one-story light manufacturing).
- MCI Concord Building F is a brownfield site (a large site that is available for infill development).
- Concord is not state-designated as an economically distressed area/economic target area.
- There is no transit serving the area and few destinations, except the prison, are within walking distance of the project. Some takings, including possibly a historic building, and displacement of the municipal power plant may be required. Other land use impacts are unclear, since the area is already very available for low-density new development with good access off Route 2.

Safety

This project is located at a high-crash location: between 1997 and 1999, the Concord Rotary was the site of 197 crashes, of which 150 involved property damage, 47 involved bodily injury, and 1 involved a fatality. As such, it ranked #71[2] in the list of the state's high-crash intersections.

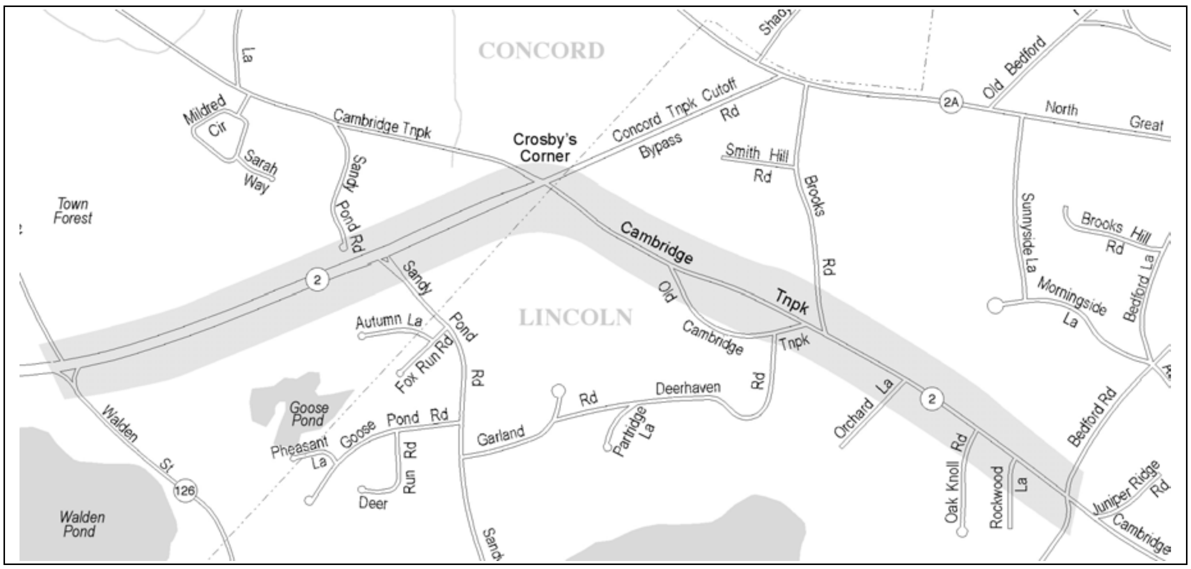
Mobility

According to the Route 2/Crosby's Corner draft environmental impact report and environmental assessment done in 1998, Route 2 is one of the five busiest radial routes extending towards Boston within eastern Massachusetts and is used as a radial commuter route during the week. The inbound peak hour traffic flow in the AM and the outbound flow in the PM represent approximately 60% of the two-way traffic. Based on 2001 MassHighway traffic counts, the average daily traffic on Route 2 east of the Concord Rotary was approximately 46,400 vehicles.

[2] The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

CONCORD AND LINCOLN: ROUTE 2/CROSBY'S CORNER GRADE SEPARATION ($15,000,000)

Realign the section of Route 2 between Bedford Road and Crosby's Corner to the north and convert it into a limited-access roadway. The existing Route 2 alignment will serve as a frontage road providing access to the adjacent homes and businesses. The newly aligned Route 2 will include two 12-foot travel lanes, separated by a Jersey-barrier median strip, and a 10-foot paved shoulder in each direction. A new bridge will be constructed to carry Route 2 traffic uninterrupted over the Crosby's Corner intersection.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
The project area includes a mix of zoning, primarily residential and business. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis for Concord and Lincoln, the area has limited future developable land and would be subject to development constraints.

Safety
According to the Route 2 Crosby's Corner draft environmental impact report (DEIR), there are two safety benefits associated with the proposed improvement. The first is that the highest volume movement (Route 2 eastbound /westbound) will no longer be required to stop at the Crosby's Corner intersection. This will reduce the potential for rear-end collisions, especially in the westbound direction, which represent 42% of the crashes at this location. An elevated grade-

separated interchange will also reduce the 6% downgrade in the westbound direction that is a contributing cause of accidents at this location.

Mobility

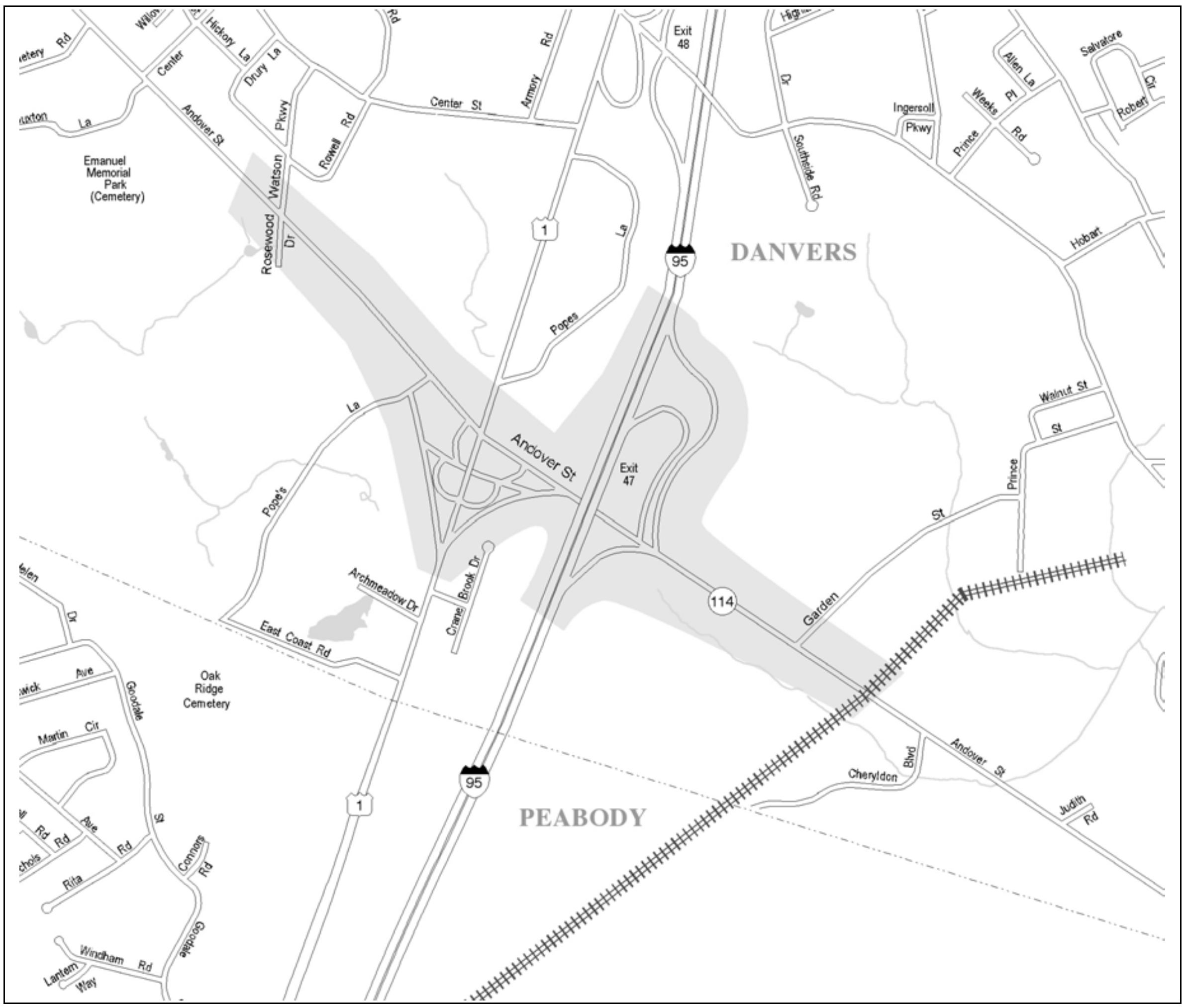
On weekdays, Route 2 between Route 128 and I-495 is a radial commuter route. The inbound peak hour traffic flow in the AM and the outbound flow in the PM represents approximately 60% of the two-way traffic. Although Route 2 provides access to some local business and residences, its primary use is for commuting through the area. According to MassHighway traffic counts, the average daily traffic on Route 2 west of Crosby's Corner was 48,000 vehicles in 1998. Average daily traffic on Route 2A east of Crosby's Corner was 11,000 vehicles in 1996. According to the intersection level of service (LOS) analysis that was done for the DEIR in 1995, the Route 2 intersection at Route 126, the Crosby's Corner intersection, and the Route 2 intersection with Bedford Road each had a LOS of F in the AM and PM peak hours.

Note:

The proposed improvements will follow the existing right-of-way (ROW) but will require land takings at certain points. The required ROW takings will impact some houses and a conservation area. The improvements will also impact several wetland areas. According to the DEIR, the proposed alternative conforms to Concord's long-range plan for a limited-access expressway.

DANVERS/PEABODY: ROUTE 1/ROUTE 114 CORRIDOR IMPROVEMENTS ($40,000,000)

This project is a major highway access improvement initiative for the Route 1/Route 114 interchange, as well as the respective corridors. The project includes the addition of a travel lane in each direction (from two to three lanes) and eliminates the center turn lane on Route 114 between the intersection of Watson Parkway and just east of the Boston and Maine Railroad bridge that crosses over Route 114. Also included in the design concept is the total reconfiguration of the Route 1/Route 114 interchange by creating a modified diamond design. Additional southbound on- and off-ramps from Route 114 to Interstate 95 will be constructed to create a full interchange.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

Zoning in Danvers west of the Route 1/Route 114 interchange is residential (with 30,000 square-foot lots) and highway commercial. East of the interchange, the

property is Zone A – 30% four-story office and 70% one-story retail. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the majority of the Route 1, Route 114, and I-95 corridors are subject to absolute development constraints in both communities; however, the corridors in Danvers are designated as redevelopment districts. According to a Route 114 and I-95 Interchange Justification Study conducted in April 1994, the construction of this project will improve traffic flow and turning movements to businesses along the corridors. Construction will also occur with few or no land takings of business sites for the roadway work.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- West of the Route 1/Route 114 interchange, land use is primarily low- to medium-density residential and commercial development. To the east, existing uses are mostly strip commercial with some office development and big box retail. There are 25 acres of developable commercial land available nearby.
- Neither Danvers nor Peabody is state-designated as an economically distressed area/economic target area.
- There is no transit service in the area.
- Widening the road, if it does reduce congestion, will make the remaining developable parcels more likely to be developed, while any redevelopment of existing uses will be constrained to the same general types and densities.

Safety

This project is located at a high-crash location—between 1997 and 1999, the Route 1/Route 114 interchange has been the site of 316 crashes, of which 197 involved property damage and 119 involved bodily injury. It ranked #10 on the list of the state's high-crash intersections. The design of this project will maintain all current movements while providing additional travel lanes for through traffic on Route 114.

Mobility

According to traffic count data collected by MassHighway, the average daily traffic on this segment of roadway was approximately 34,700 vehicles in 1999. According to the Justification Study, the Route 1/Route 114 intersection has serious traffic congestion in both the morning and evening peak periods, in part because direct access from Route 114 to I-95 southbound is restricted. In terms of delay, average travel speed on Route 114 is below 70 percent of the posted speed in the eastbound direction in the PM peak period (source: 2001/2002 Congestion Management System monitoring).

EVERETT, MALDEN, AND MEDFORD: TELECOM CITY BOULEVARD ($13,000,000)

Construct a two-lane, median-divided roadway between Santilli Highway in Everett and Corporation Way in Medford, with a bridge across the Malden River. This new road will link the entire TeleCom City development project, located on both sides of the river, into one unified campus. Santilli Highway and Route 16 in Everett will provide primary vehicular site access; however, Corporation Way will also provide access from the west side of the campus. The new road, TeleCom City Boulevard, will accommodate public traffic and improve access between the three communities.

Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The TeleCom City project is located in west Everett, south Malden, and east Medford and involves the redevelopment of a brownfield into a modern campus of office buildings housing research and development enterprises. The land is zoned for office use in Medford and industrial use in Everett and Malden. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the land is subject to absolute development constraints in Everett, Malden, and Medford. However, parcel sites in Everett and Malden are designated as redevelopment districts for medium density office.

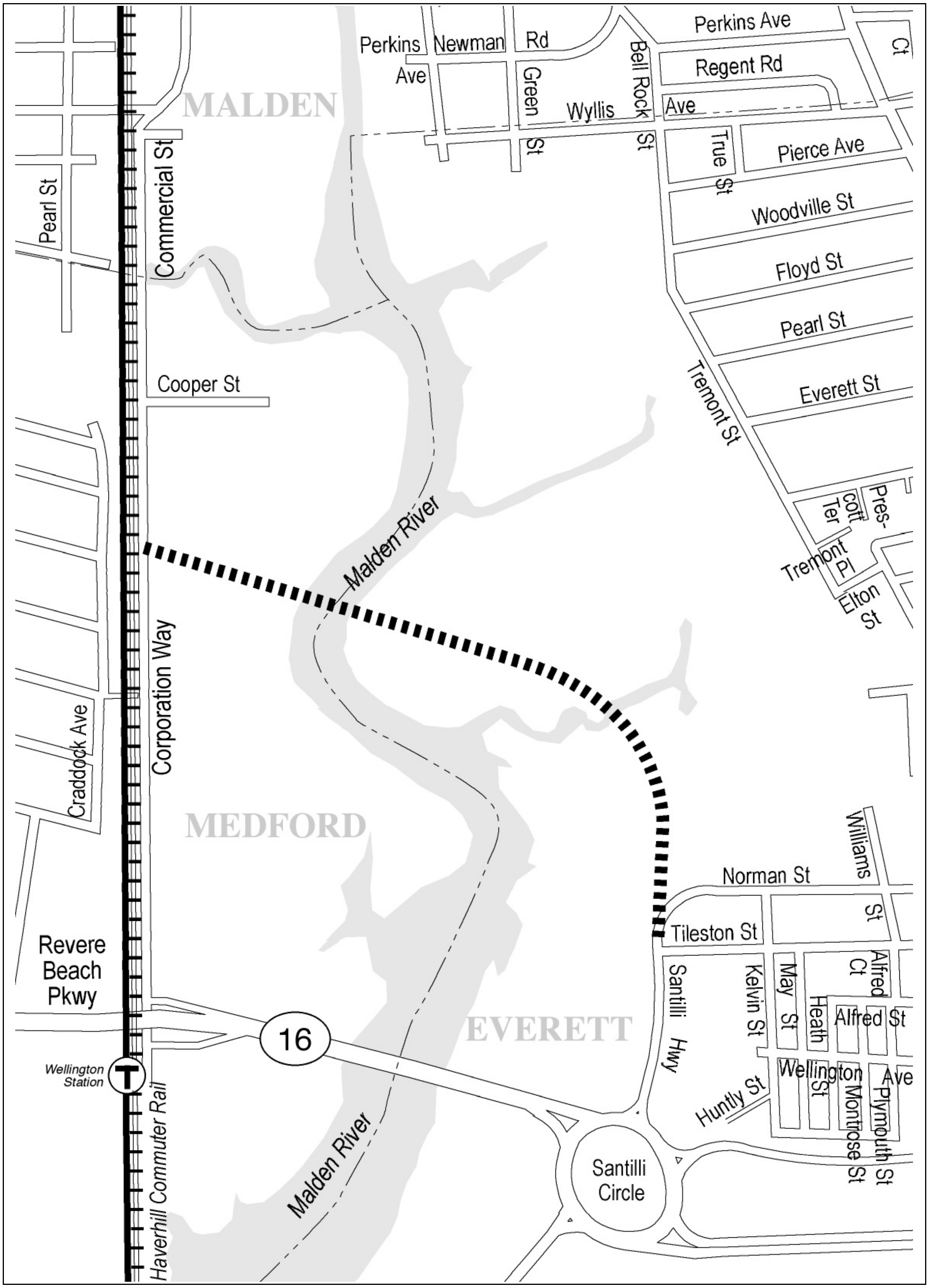
The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- This project is designed to support the development of Telecom City, and will not have significant impacts on existing safety or congestion problems on current roadways. The Telecom City project is a single-use office/research and development design, not a mixed-use development design. The project, as currently designed, is not well served by transit, and walk and bicycle connections to existing neighborhoods are lengthy.
- The Telecom City site is considered a brownfield site (large site that is available for infill development).
- Malden, Everett, and the Telecom City site in Medford are state-designated as economically distressed areas/economic target areas.

Economic Opportunities

According to the TeleCom City environmental notification form, the TeleCom City project will function as headquarters for the telecommunications industry in the state. Success of TeleCom City is expected to spur further economic development within the three communities and provide additional economic benefits to the Boston region. The construction of this roadway project will help

facilitate redevelopment within and around TeleCom City and address traffic operations and safety concerns in all three communities.



Perkins Ave
Newman Rd
Green St
Wyllis Ave
Bell Rock St
Perkins Ave
Regent Rd
Ct
True St
Pierce Ave
Woodville St
Floyd St
Pearl St
Everett St
Tremont St
Pres-cott Ter
Tremont Pl
Elton St
MALDEN
Pearl St
Commercial St
Cooper St
Malden River
Corporation Way
Craddock Ave
MEDFORD
Williams St
Norman St
Tileston St
Santilli Hwy
Kelvin St
May St
Heath St
Alfred Ct
Alfred St
Wellington St
Wellington Ave
Montrose St
Plymouth St
Huntly St
Revere Beach Pkwy
16
EVERETT
Wellington Station
Haverhill Commuter Rail
Malden River
Santilli Circle

EVERETT AND MEDFORD: ROUTE 16 (MEDFORD VETERAN'S MEMORIAL PARKWAY/REVERE BEACH PARKWAY)
($80,000,000)

Widen Route 16 where necessary to provide a continuous six-lane mainline parkway cross-section between Route 38 in Medford and Sweetser Circle in Everett, except for a four-lane segment in the vicinity of Wellington Circle. Wellington Circle will be replaced with a tight single-point diamond interchange, under which the four-lane section of Route 16 would pass.

At the western limit of the project, the Interstate 93, Route 38, and Route 16 ramps will be realigned and relocated where necessary and additional ramps will be constructed. The connection between I-93 and Route 38 will be realigned and reconstructed by switching the I- 93 southbound on-ramp and off-ramp, so that the current on-ramp becomes the off-ramp and vice versa. In addition, the on-ramp and off-ramp from Route 38 to I-93 northbound will be relocated to a new grade-separated interchange and combined with a new connection from Route 16 directly onto I- 93.

Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The land use along Revere Beach Parkway varies from commercial/industrial and high-density residential to parklands. From Route 38 to Wellington Circle, the predominant land use is parklands, except for commercial/industrial, with high-density residential uses on the north part of Route 16. From Wellington Circle to Sweetser Circle in Everett, a variety of land uses are present: the State Police barracks, the Wellington Station of the MBTA's Orange Line (including a regional park-and-ride complex and an Orange Line maintenance facility), TeleCom City, Mellon Bank office building, Gateway Center regional shopping center, and the Hendersonville residential neighborhood of Everett.

According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the area is subject to absolute development constraints, with the exception of the TeleCom City redevelopment site.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Most adjacent parcels have already been developed as low-density commercial (highway uses and some office park), industrial, and residential (high density).
- There are many brownfield sites (large sites that are available for infill development) in the corridor.
- The city of Everett is state-designated as an economically distressed area/economic target area; Medford is not, except for the Telecom City site.
- Zoning in Medford south of Route 16 is recreation (Mystic River Reservation), as well as with mixed-use and industrial (the Mystic Center development proposal, just south of Wellington Circle, will include high-density office and residential uses). North of Route 16, zoning in Medford is industrial, commercial, office, and residential (high-density 5,000 square-foot lots). In Everett, zoning is single-use industrial and residential (high density).
- The project should improve drive access to the Wellington MBTA Orange Line station from the west, although Wellington is not close enough to neighborhoods or employment sites to provide walk-access. The improved auto access to the corridor may encourage some redevelopment of existing uses, but any such redevelopment is likely to use up the additional capacity added to the roadway.

Safety
Four intersections along the project corridor are in the top one thousand high-crash locations from 1997–1999:

- Route 16/Route 28 (Fellsway) is ranked #9 with 343 crashes, of which 225 involved property damage and 118 involved bodily injury.
- Route 16/I-93 is ranked #14 with 295 crashes, of which 187 involved property damage and 108 involved bodily injury.
- Route 16/Locust Street is ranked #434* with 47 crashes, of which 23 involved property damage and 23 involved bodily injury.
- Route 16/Corporation Way is ranked #846* with 32 crashes, of which 15 involved property damage and 17 involved bodily injury.

Mobility
According to the Route 16 Parkway Corridor Improvement Study completed for the Mystic Valley Development Commission in 2000, the average daily traffic along Route 16 in the project area ranges from 61,150 vehicles west of Santilli Circle to 43,550 vehicles east of Santilli Circle (1997 counts).

According to 2002 Congestion Management System (CMS) travel monitoring performed by CTPS, the average delay on Route 16 in the project area is greater than one minute in the eastbound and westbound directions in the AM peak period. In addition, average travel speed on Route 16 is at 15 mph or less (level of service E/F) along six segments in the eastbound and westbound directions in both the AM and PM peak periods.

Strengthen Economic Opportunities
Route 16 is an important east-west arterial that connects the communities of Cambridge, Arlington, Medford, Everett, Chelsea, and Revere. It also serves as a connection between East Boston and Logan Airport and I-93. According to the Route 16 Corridor Improvement Study, one of the main purposes of this project is to provide adequate access to the future TeleCom City development in Medford, Everett, and Malden.

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* The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

FRAMINGHAM: ROUTE 126/135 GRADE SEPARATION ($50,000,000)

Construct a 700-foot, below-grade underpass (one-travel lane in each direction) from Park Street to Irving Street, allowing through traffic on Route 126 (Concord Street) to pass underneath Route 135 (Waverly Street) and the railroad tracks. The majority of the underpass will consist of an ascending/descending ramp with an open roof; approximately 135 feet of it will be a tunnel under Route 135 and the railroad tracks.

Travel lanes will be maintained at grade on Route 126 to intersect at Route 135, with upgraded signalization. Each approach to this intersection will have at least two lanes, and all turning movements will be permitted. The open-box configuration of the underpass will prohibit traffic on Howard Street from crossing Concord Street and preclude southbound traffic on Route 126 from turning left onto Irving Street.

The design concept for the project includes extensive streetscape amenities such as widened sidewalks, street trees, decorative lighting, and benches. The project also has the potential to encourage economic development in downtown Framingham, partially through the redevelopment of parcels taken for the roadway reconstruction.

Construction of this project will require land-takings, including sites currently in use by downtown businesses. It will also necessitate the elimination of approximately 30 on-street parking spaces.

Project's Context/Possible Impacts, by MPO Policy Area

Land Use

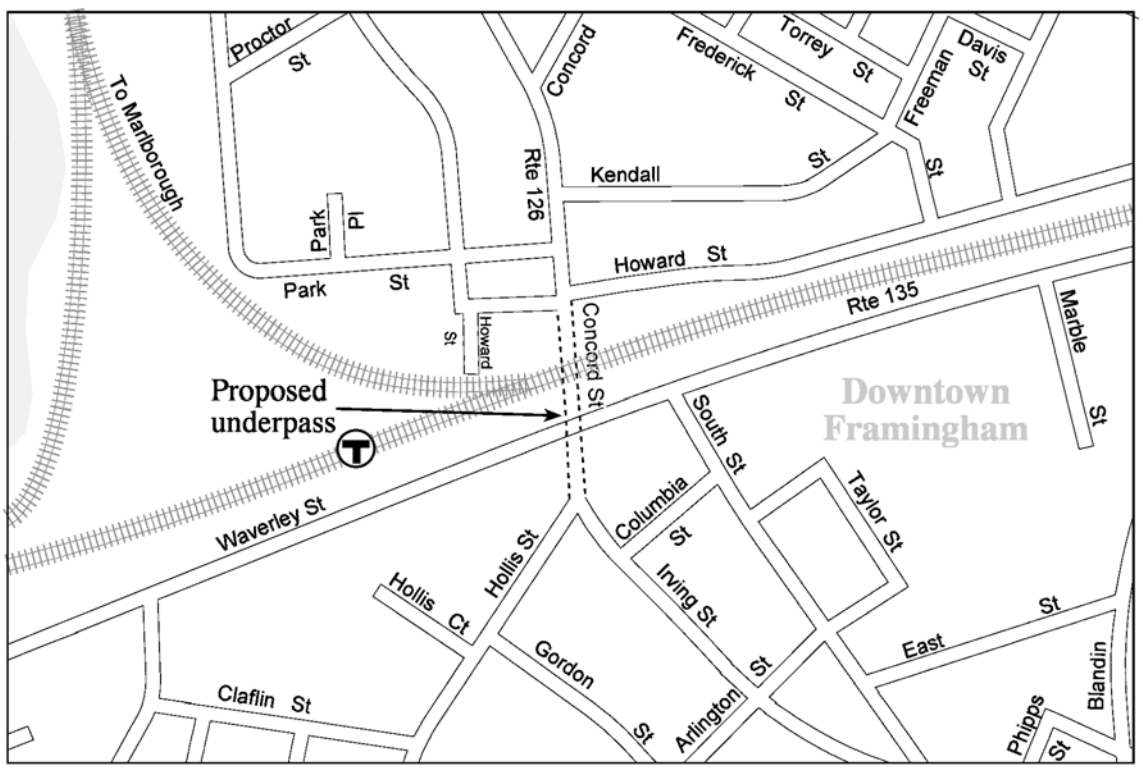
This project is located in Framingham's central business district, which, according to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, is subject to absolute development constraints but is a designated redevelopment district. According to the Route 126 Corridor Study, the construction of this project would help facilitate downtown redevelopment by making the downtown area a more attractive location and by providing redevelopment sites through the partial taking of business sites as necessary for the roadway work.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- The project is located in Framingham's Central Business District (CBD), which has a high-density mix of commercial, residential, and government uses. South of the railroad tracks are industrial uses. The zoning is general

residence (8,000 square-foot lots) and business to the south, commercial and industrial to the north, and manufacturing to the west.

- The CBD is a designated redevelopment district in Framingham.
- Framingham is state-designated as an economically distressed area/economic target area.
- There are several brownfield sites (large sites that are available for infill development) within a quarter mile of the project.
- The separation of Route 126 through traffic should improve pedestrian/bicyclist access across the corridor.
- The project has the potential to support redevelopment in the area. In a redevelopment buildout analysis done for the Central Business Redevelopment District, redevelopment was assumed to be 100% six-story mixed-use buildings consisting of first floor retail and five floors of two-bedroom apartments. This is several stories higher than the current uses in the area, and would result in a large increase in the number of trips generated in the district.



Safety
This project is located at a high-crash location—between 1997 and 1999, Route 126 at Route 135 has been the site of 134 crashes, of which 101 involved only property damage and 33 involved bodily injury. As such, it ranked #136[3] in the list of the state's high-crash intersections. As described above, the design of this project maintains all current movements at the intersection, while providing additional travel lanes for through traffic.

Mobility
This project provides additional travel lanes for through traffic on Route 126, bypassing at-grade intersections with Route 135 and the railroad tracks. According to the Route 126 Corridor Study, the average daily traffic on this segment of roadway is approximately 22,000 vehicles (1996 figure). The Route 126/Route 135 intersection functions at level of service F in the morning and evening peak periods. In terms of delay, the intersection is tentatively rated as the second worst in the MetroWest subregion and the eighth worst in the MPO region (source: 2001/2002 Congestion Management System monitoring).

Connectivity
The Framingham commuter rail station is located near the project site; however, the project does not significantly affect either vehicle or nonmotorized access to the station. All LIFT buses currently connect at a bus stop on the corner of Route 126 and Howard Street; the project as envisioned will eliminate pedestrian and vehicle access across Howard Street. The LIFT 3 bus makes connections southeast of the project site; the project as envisioned will not impact this route, as it accesses the area via the at-grade connection between Route 126 and Route 135.

Environmental Justice
An MPO-designated community of concern is located in Southeast Framingham adjacent to the project site. This project will facilitate some level of northerly traffic originating from this area or southerly traffic going to the area; however, the project has not been identified as a priority by the environmental justice community.

Economic Opportunities
According to the Route 126 Corridor Study, this project is closely related to the redevelopment of the downtown Framingham central business district.

[3] The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

Community Character
As currently envisioned, the project includes many streetscape amenities and will facilitate downtown redevelopment, including possible façade improvements in the area of the town common. The project also eliminates a significant congestion point in downtown Framingham.

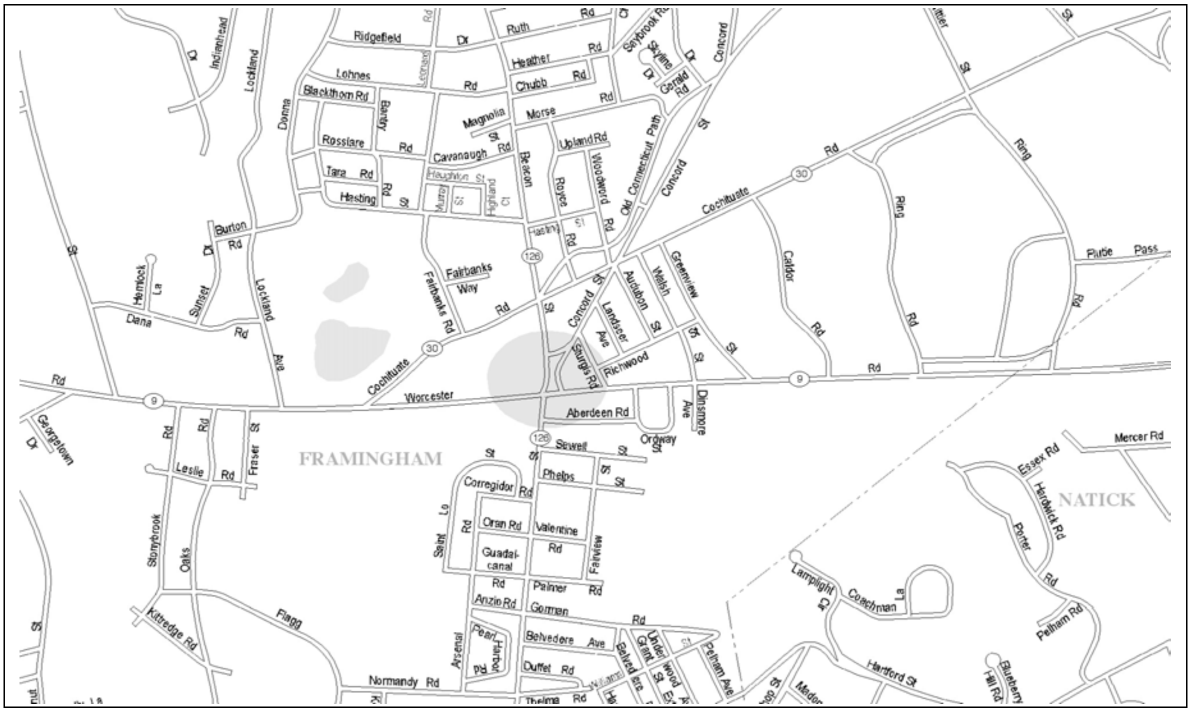
Note

The Route 126 Corridor Study estimated the cost of this project at $35 million to $40 million, $15 million of which is for right-of-way acquisition. Assuming a relatively modest escalation rate of 3.5% per annum,[4] the cost of this project will exceed $50 million by 2005.

[4] This escalation rate is the amount currently used by the MBTA to estimate capital costs of mid-term and long-term projects and is based, in large part, on a review of recent unit costs for construction of the Central Artery Project, including all relevant adjustments for local conditions and the labor environment.

FRAMINGHAM: ROUTE 9/ROUTE 126 INTERCHANGE ($15,000,000)

Improve the existing interchange at Route 9 (Worcester Road) and Route 126 (Concord Street). The Route 126 bridge is listed in the Statewide Road and Bridge list, and its reconstruction would be a major element of this project. MassHighway rates this bridge as structurally deficient.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

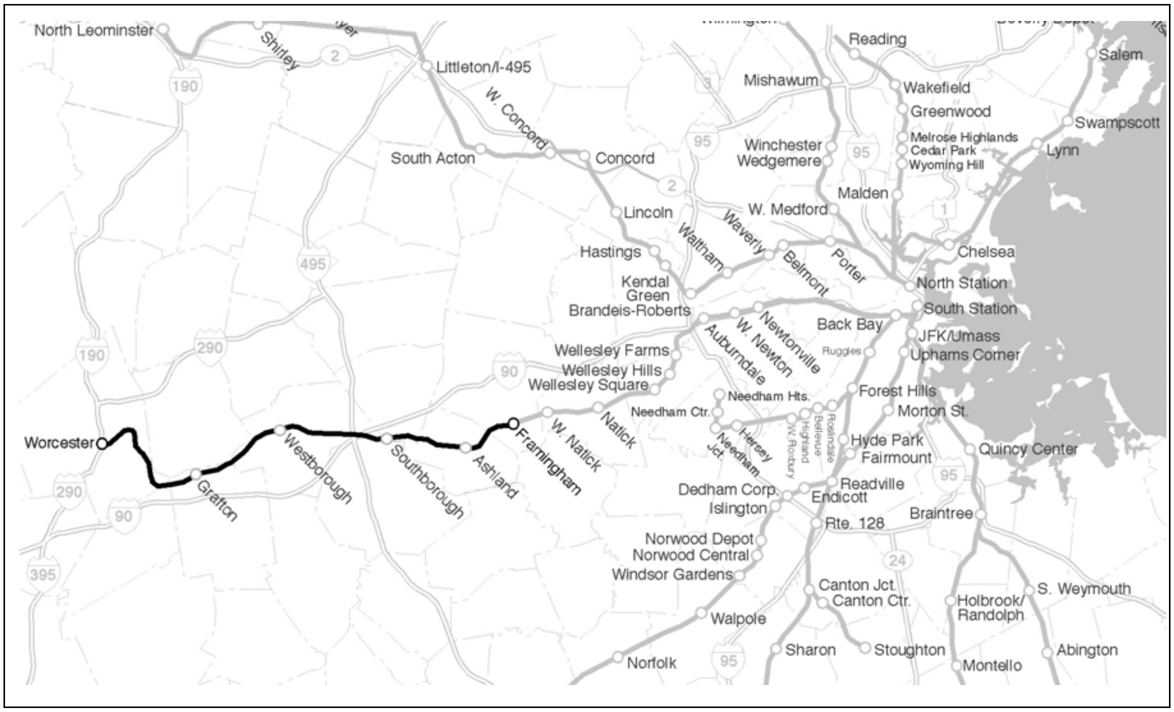
The project is located in the Golden Triangle business area of Framingham. The Golden Triangle has a special overlay-zoning district, which classifies the area surrounding the project as a Regional Center. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the project area is subject to absolute development constraints.

Mobility

According to the Boston MPO's Congestion Management System, two major points of delay affect the Route 9/Route 126 intersection in the PM peak period: Route 126 southbound to Route 9 westbound is delayed an average of 19 seconds and Route 126 southbound to Route 9 eastbound is delayed an average of 15 seconds.

FRAMINGHAM TO WORCESTER: DOUBLE-STACK INITIATIVE ($8,000,000)

All bridges crossing over the CSX rail line from Framingham to Worcester will be raised to accommodate double-stack freight trains.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
There will be no changes in land use as a result of this project; the rail line is currently operating through the project area.

Mobility
This project will improve the capacity and operations of an existing freight facility. Benefits could include the reduction of truck traffic related to the movement of goods from the Port of Boston.

Connectivity
This project will improve rail access to Boston and will make the port more attractive in the highly competitive sea freight market. Its benefits include a probable increase in freight business for the port.

HANOVER: ROUTE 53 ($4,000,000)

Widen the one-mile section of Route 53 between Mill Street and Rawson Road from two lanes to five lanes: two lanes in each direction and a two-way center turn lane. A six-foot sidewalk will be added to the west side of the roadway. Some driveway entrances will be relocated or consolidated with other driveways.

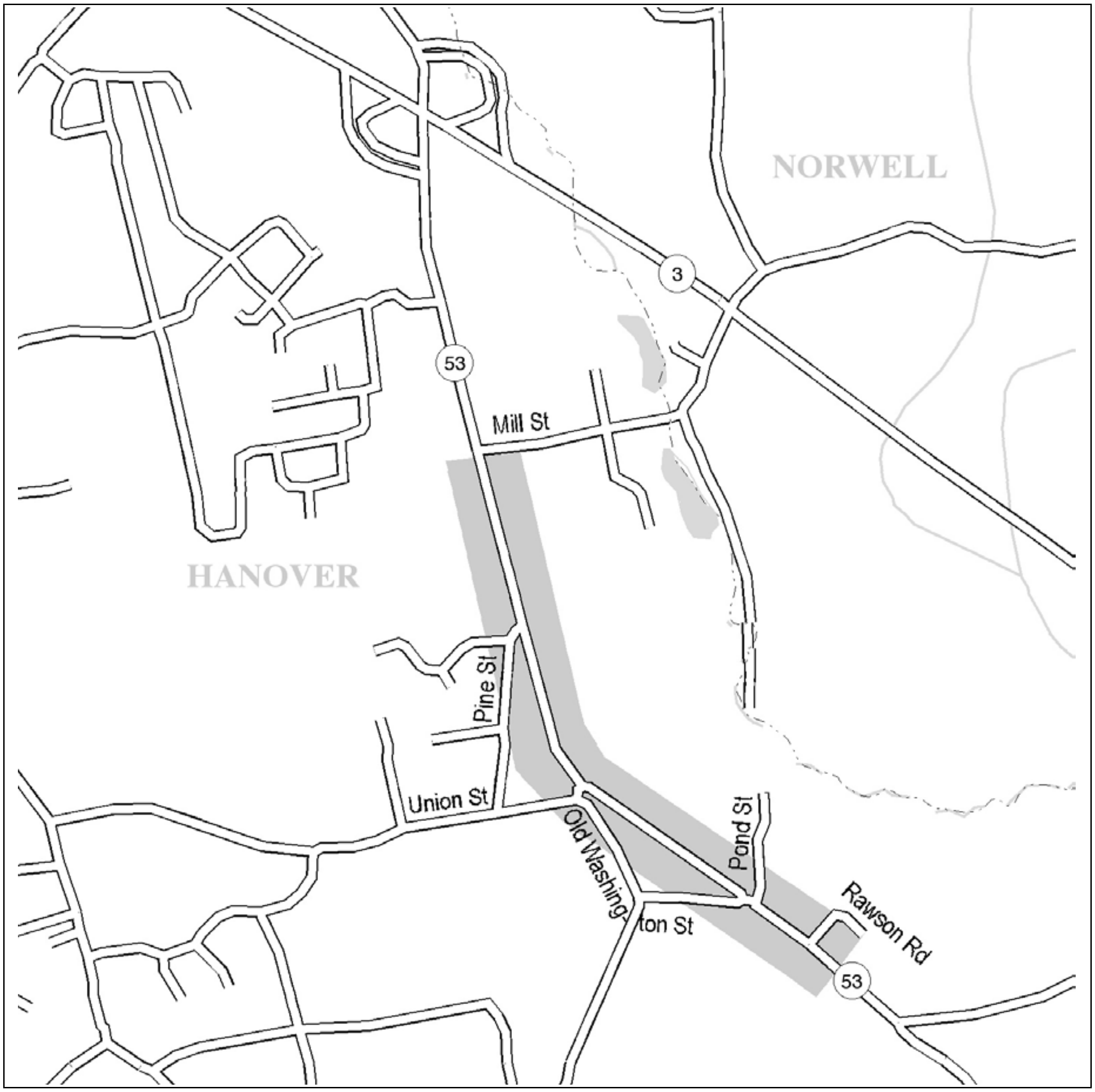
Pond Street will be relocated and realigned approximately 210 feet north of its current location to intersect Route 53 opposite Old Washington Street, creating a four-legged intersection. The existing traffic signal at the Route 53/Old Washington Street intersection will be upgraded to accommodate this new configuration.

Project's Context/Possible Impacts, by MPO Policy Area

Land Use
The project is located just south of Route 3 in an area zoned for commercial use. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the area is subject to partial development constraints.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Immediately surrounding Route 53, parcels are zoned light industrial and commercial. Outside of the commercial area, the land is zoned as residential (60,000 square-foot lots). The zoning north of Mill Street is planned shopping center (Hanover Mall). The commercial land surrounding Route 53 is mostly developed (with some areas still remaining to be developed). The developed residential area is very low density, with approximately 100 acres of developable residential land remaining (with 60,000 square-foot lots required).
- There are no brownfield sites (large sites that are available for infill development) nearby.
- Hanover is not a state-designated economically distressed area/economic target area.
- The corridor is mostly auto-dependent and significant new development and/or redevelopment (which will be encouraged by this widening) could use up most of the capacity additions of the project.

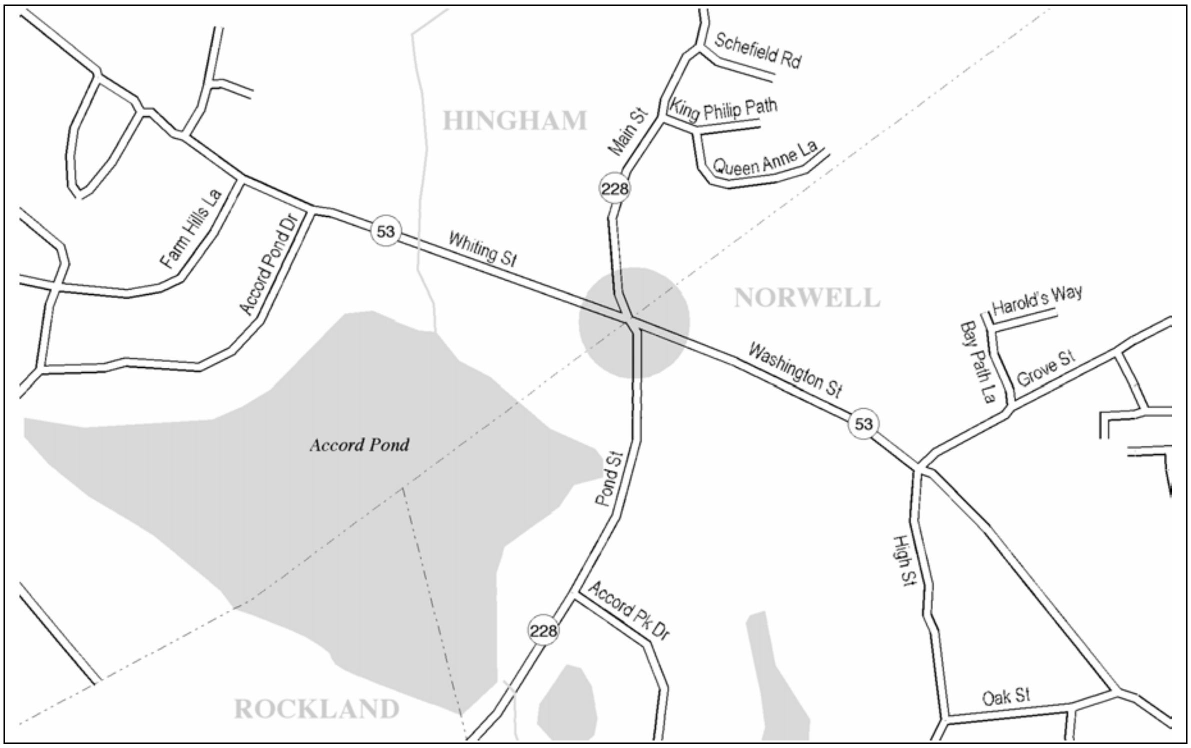


Mobility

According to the traffic counts in the environmental impact report that has been produced for this project, average daily traffic within the project area is approximately 29,000 vehicles. Traffic operates at level of service (LOS) E during the weekday morning peak period and, depending on the segment, at LOS E or F during the weekday evening and Saturday midday peak hours. The poor levels of service are caused mainly by turning vehicles entering and exiting driveways along the corridor. The turning movements conflict with through traffic flow. The Old Washington Street/Route 53 intersection currently operates at LOS F during the weekday evening and Saturday midday peak hours.

HINGHAM/NORWELL: ROUTE 53/228 ($2,500,000)

Reconstruct the Route 53/Route 228 intersection in Hingham (Queen Anne's Corner) to widen all four approaches to a three-lane cross section, including a center left-turn lane. Intersection improvements will also be done at the High Street/Grove Street intersection in Norwell. A center left-turn lane will be added between the two intersections (approximately one-half mile).



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The project is located in an area zoned for business use. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the area is subject to absolute development constraints.

Safety

This project is located at a high-crash location: between 1997 and 1999, Route 228 at Route 53 was the site of 46 crashes, of which 27 involved property damage and 19 involved bodily injury. It ranked #614[5] in the state's high-crash intersections. The new design will maintain all current movements at the intersection while providing additional left-turn lanes.

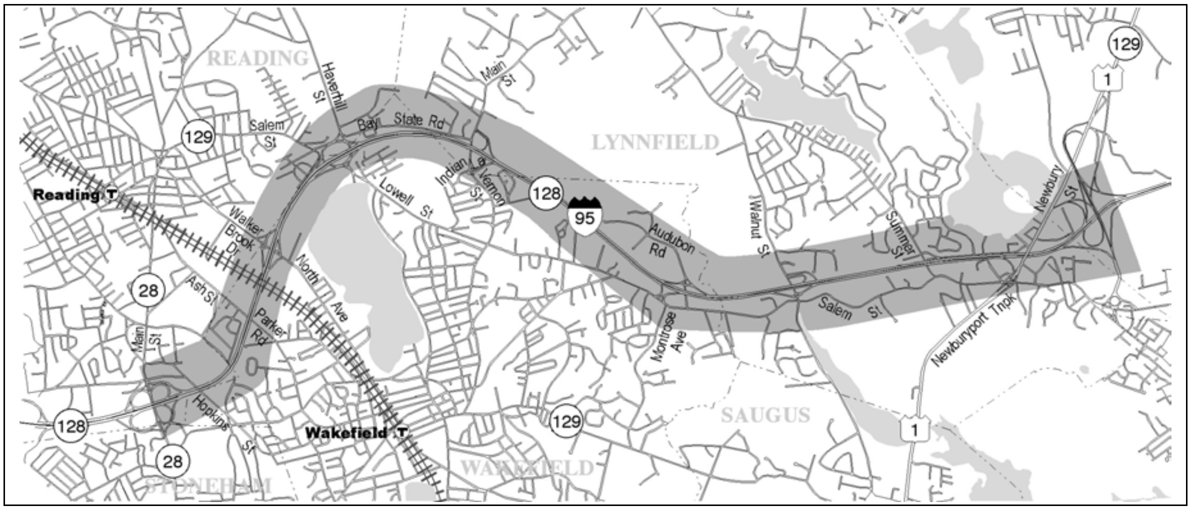
Mobility

MassHighway conducted traffic counts on Route 53, north of Route 228, in 1999. At that time the average daily traffic was 20,300 vehicles. According to a corridor study performed for Route 53 in Norwell in 1991, this intersection was operating at level of service (LOS) D in the AM peak period and LOS E in the PM peak period. In terms of delay, the Route 228/Route 53 intersection is tentatively rated as the second most delayed intersection in the South Shore Coalition subregion in the PM peak period (source: 2001 Congestion Management System monitoring). The average speed on Route 53 is 15 mph or less, which translates into LOS E/F in the northbound direction during the AM peak period. The travel speed is below 70% of the posted speed limit in the northbound and southbound directions in both the AM and PM peak periods.

[5] The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

LYNNFIELD TO READING: ROUTE 128 CAPACITY IMPROVEMENTS ($50,000,000)

Add one general-purpose lane in each direction of Route 128 between Route 1 in Lynnfield and Route 28 in Reading.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

Zoning along this stretch of Route 128 ranges from residential, business, and industrial in Reading to residential, limited business, and light industrial in Wakefield, to residential with a small area of limited business in Lynnfield. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the majority of the land in the project area is subject to absolute development constraints. Each of the communities does have a limited number of parcels of developable land along Route 128.

Safety

This project area includes three high-crash locations—Route 128/Route 129 and Route 128/North Avenue in Wakefield and Route128/Walnut Street in Lynnfield. Between 1997 and 1999, the Route 128/Route 129 intersection was the site of 105 crashes, of which 66 involved property damage, 38 involved bodily injury, and one resulted in a fatality. It ranked #136[*]on the list of the state's high-crash intersections. The Route 128/North Avenue intersection was the site of 63 crashes, of which 36 involved property damage and 27 involved bodily injury. It ranked #330[*] on the list of the state's high-crash intersections. The Route

[*] The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

128/Walnut Street intersection was the site of 40 crashes, of which 26 involved property damage and 14 involved bodily injury. It ranked #908* on the list of the state's high-crash intersections.

Mobility
According to MassHighway traffic counts, the average daily traffic on Route 128 along this stretch of roadway is as follows:

Reading:
- North of I-93 (2000 counts) – 153,000 vehicles

Wakefield:
- North of Route 28 (2000 counts) – 138,400 vehicles
- North of North Avenue (1999 counts) – 132,700 vehicles
- North of Route 129 (2000 counts) – 134,700 vehicles
- North of Main Street in Lynnfield (1999 counts) – 128,200 vehicles

Lynnfield:
- South of Walnut Street (2000 counts) – 129,399 vehicles
- South of Peabody Circle (2001 counts) – 119,750 vehicles

According to the CTPS memorandum *Potential Long-Range Plans for Improving Express Highway in the Boston Metropolitan Region* dated December 27, 2000, this section of Route 128 is very congested largely due to the southbound AM queues that regularly develop from Lynnfield to Interstate 93. The capacity constraints of the
I-93/Route 128 interchange in Woburn (see related project description) also contribute to the congestion.

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* The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

MALDEN, REVERE AND SAUGUS: ROUTE 1 IMPROVEMENTS
($33,600,000)

Widen Route 1 from four to six lanes between Copeland Circle (Route 60) and Route 99. As part of this project, the on- and off-ramps at Salem Street and Lynn Street will be reconstructed to provide acceleration/deceleration lanes, better turning radii, and full turning movements. Also, the connection between Route 99 and Route 1 will be improved by providing a normal right-lane merge from Route 99 northbound to Route 1 northbound.

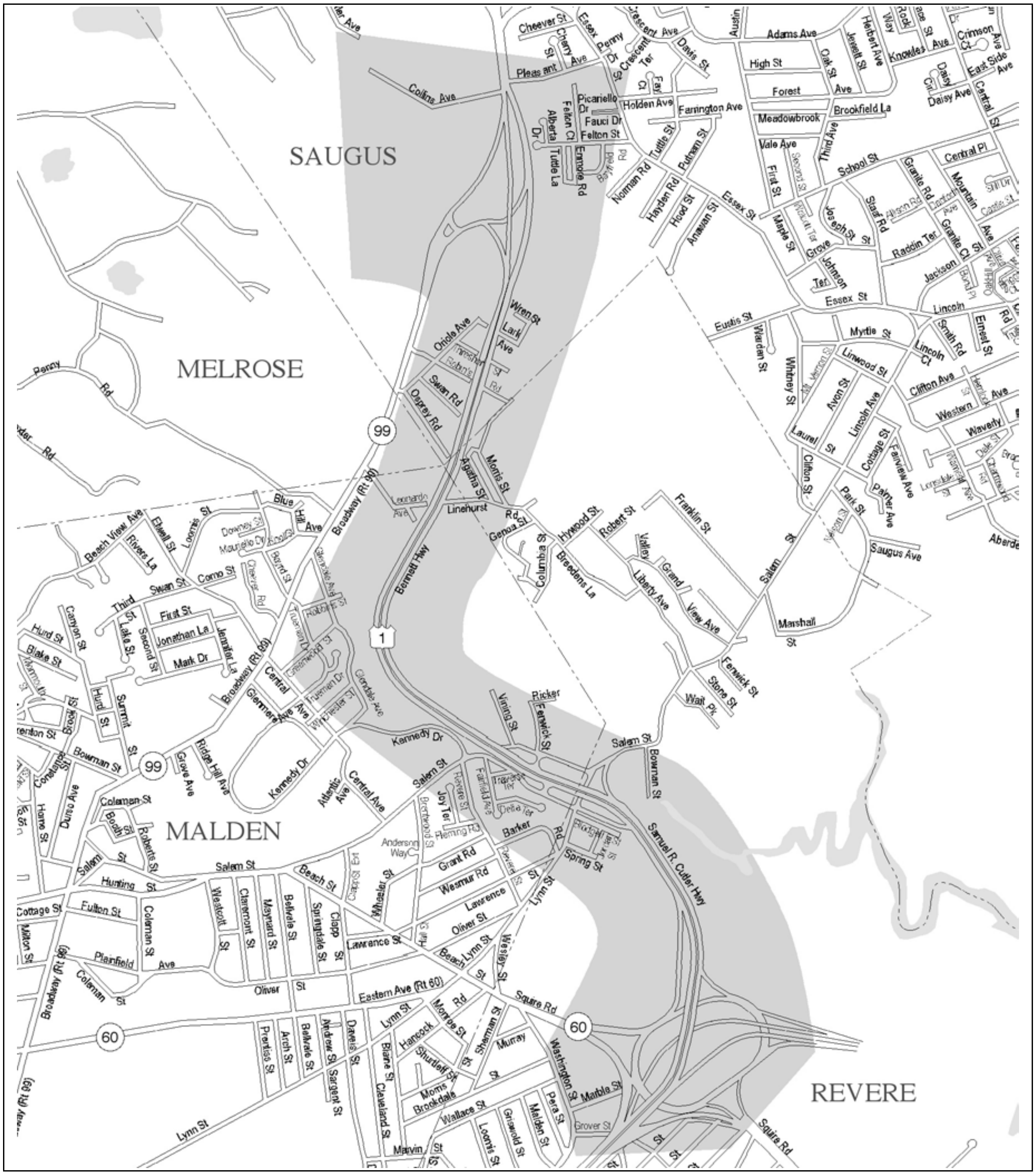
Project's Context/Possible Impacts, by MPO Policy Area

Land Use

Zoning along Route 1 in the project area is primarily residential, light industrial and highway-oriented businesses. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, two redevelopment areas exist in the project area—the land between Route 1 and Route 99 in Saugus, and to the south, the Rowe Quarry Redevelopment Area in Malden and Revere.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- There are mostly residential uses in the northern end of the corridor with a few highway businesses that have access to Route 1. Land use in the Copeland Circle area is commercial, including a multiplex cinema, motel, and the Northgate Mall.
- A large residential development is proposed at the Rowes Quarry site. The redevelopment of the Rowes Quarry site is unlikely without improved access provided by an improved interchange. Rowes Quarry is a brownfield site (a large site that is available for infill development), with other brownfield sites nearby. Currently the planned access is only via roadway. With auto-only access, the proposed development could use up to two-thirds of the proposed additional capacity provided by the project on Route 1. The Bike-to-the-Sea path and the currently abandoned Saugus Branch railroad branch skirt the south end of the Rowes Quarry site and could be used to provide multimodal access.
- Both Malden and Revere are state-designated as economically distressed areas/economic target areas.



Safety

This project area includes a high-crash location—between 1997 and 1999, the intersection of Route 1 and Copeland Circle in Revere was the site of 466 crashes, of which 250 involved property damage and 215 involved bodily injury, with one resulting in a fatality. It ranked #2 on the list of the state's high-crash intersections.

In addition, according to the Lower North Shore Transportation Improvement Study conducted by CTPS in 2000, unsafe traffic operations are present at the on- and off-ramps of the Salem Street/Lynn Street interchange due to the ramps' geometric limitations, including the absence of deceleration and acceleration lanes, the tight turning radii, and the close proximity of adjacent ramps.

Mobility

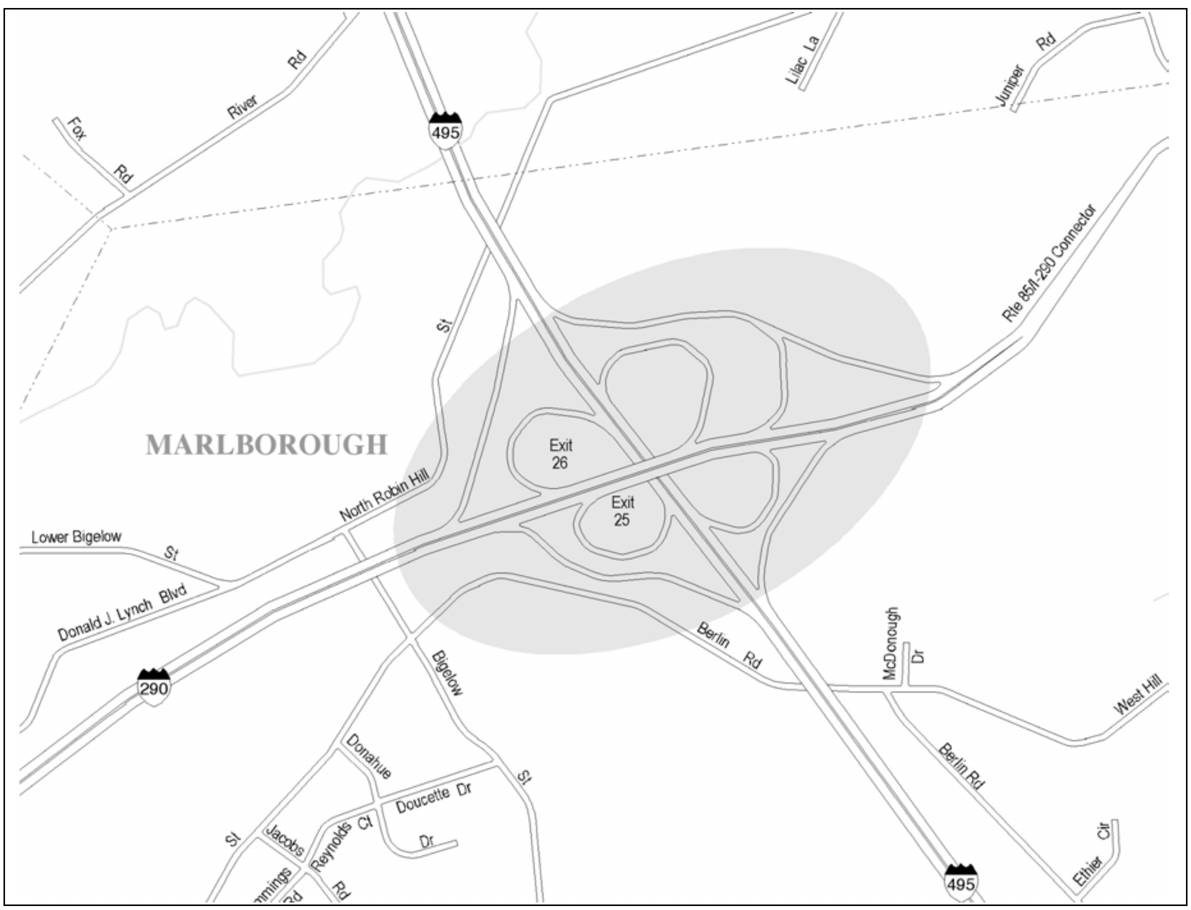
Average daily traffic (ADT) along Route 1 at the Malden/Revere city line was 95,500 in 1996, according to traffic volume data compiled by MassHighway, while ADT along Route 1 one-half kilometer north of Sargent Street (south of Route 60) was 54,600 in 1998. Traffic volumes along Route 1 are significantly higher north of Copeland Circle (Route 60), as Route 60 serves as the major east-west connector between towns north of Malden and the coast, Logan Airport, and the Wonderland Blue Line Station. Despite this, Route 1 has six lanes south of Copeland Circle and narrows to four lanes north of the Circle. According to the Lower North Shore Study, recurring congestion occurs on Route 1 southbound at the Route 60 off-ramp during the AM peak period and on Route 1 northbound at the Route 60 on-ramp during the PM peak period.

MARLBOROUGH: INTERSTATE 495/INTERSTATE 290/ROUTE 85 CONNECTOR INTERCHANGE ($28,000,000)

Construct a flyover ramp from I-495 northbound to I-290 westbound and a flyover ramp from I- 290 eastbound to I-495 northbound. Specifically, the changes will include:

- The replacement of the current ramp from I-495 southbound to I-290 westbound with a two-lane ramp, realigned to provide a safer turning radius.
- The replacement of the existing clover loop ramp from I-495 northbound to I-290 westbound with a two-lane flyover from I-495 to I- 290 on the left side, well past the I-495 southbound/I-290 westbound merging area.
- The replacement of the existing clover loop ramp from I- 290 eastbound to I-495 northbound with a two-lane flyover, designed to provide a safer turning radius. Also, the existing loop ramp in the northwest corner of the interchange will be realigned to accommodate the new ramp configuration.

As part of this project, Celluci Highway (Route 85 Connector) will be widened from two lanes to four lanes from I-495 to Fitchburg Street.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The primary land use in the project area is residential, although commercial and industrial uses are also present. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the area has a large amount of developable land around the project area. The Route 85 Connector Transportation Study by MassHighway (November 2001) identified seven proposed developments and 80 proposed single-family houses in the study area.

Safety

This project is located at a high-crash location—between 1997 and 1999, the I-495/I-290 interchange has been the site of 166 crashes, of which 95 involved property damage and 71 involved bodily injury. It ranked #56[6] on the list of the state's high-crash intersections.

According to the Route 85 Connector Transportation Study by MassHighway (November 2001), historically there has been a high incidence of truck rollovers at the interchange. These rollovers predominately occur on the ramp from I-290 eastbound to I-495 northbound. This is due in large part to the combination of the tight turning radius of the ramp and excessive speeds of vehicles entering the interchange.

Mobility

According to traffic counts performed by MassHighway in 2001, the average daily traffic for I-290 west of I-495 was 71,200 vehicles, for I-495 north of I-290 it was 98,500 vehicles, and for I-495 south of I-290 it was 82,500 vehicles. According to the Route 85 Connector Transportation Study, the ramps connecting I-290 to I-495 northbound and southbound have failing or almost failing levels of service.

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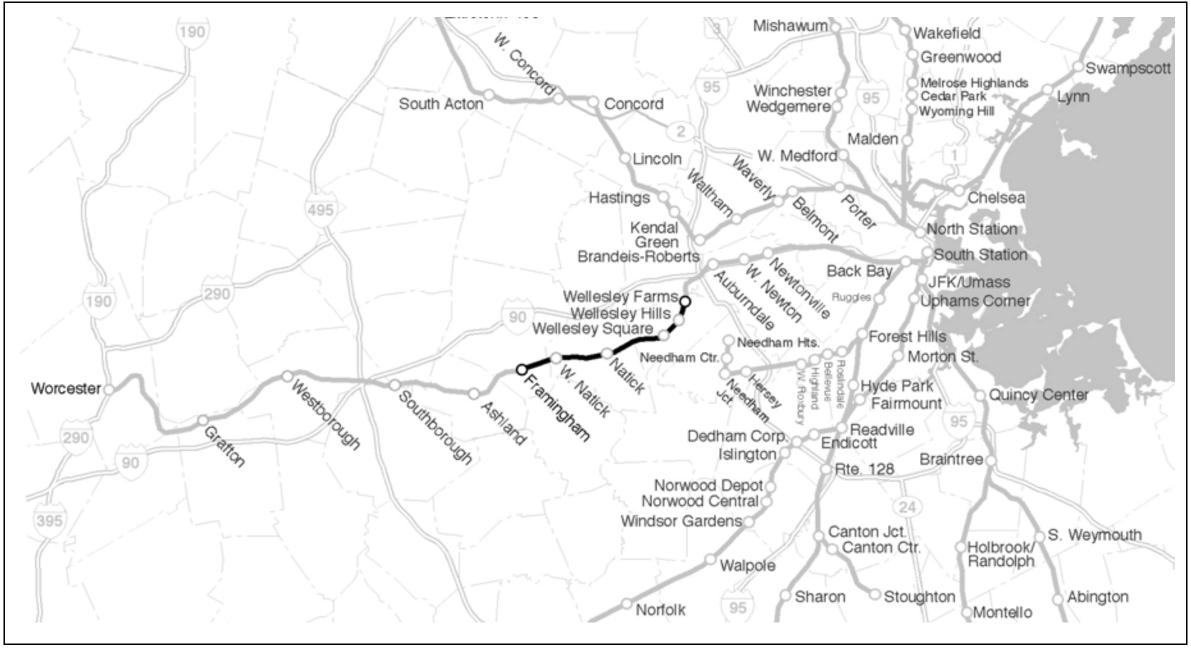
[6] The MPO safety ranking of this intersection is different from the official MassHighway ranking due to a different numbering system.

NATICK TO WELLESLEY: DOUBLE-STACK INITIATIVE ($20,000,000)

All bridges crossing over the CSX rail line from Natick to Wellesley will be raised to accommodate double-stack freight trains.



Project's Context/Possible Impacts, by MPO Policy Area

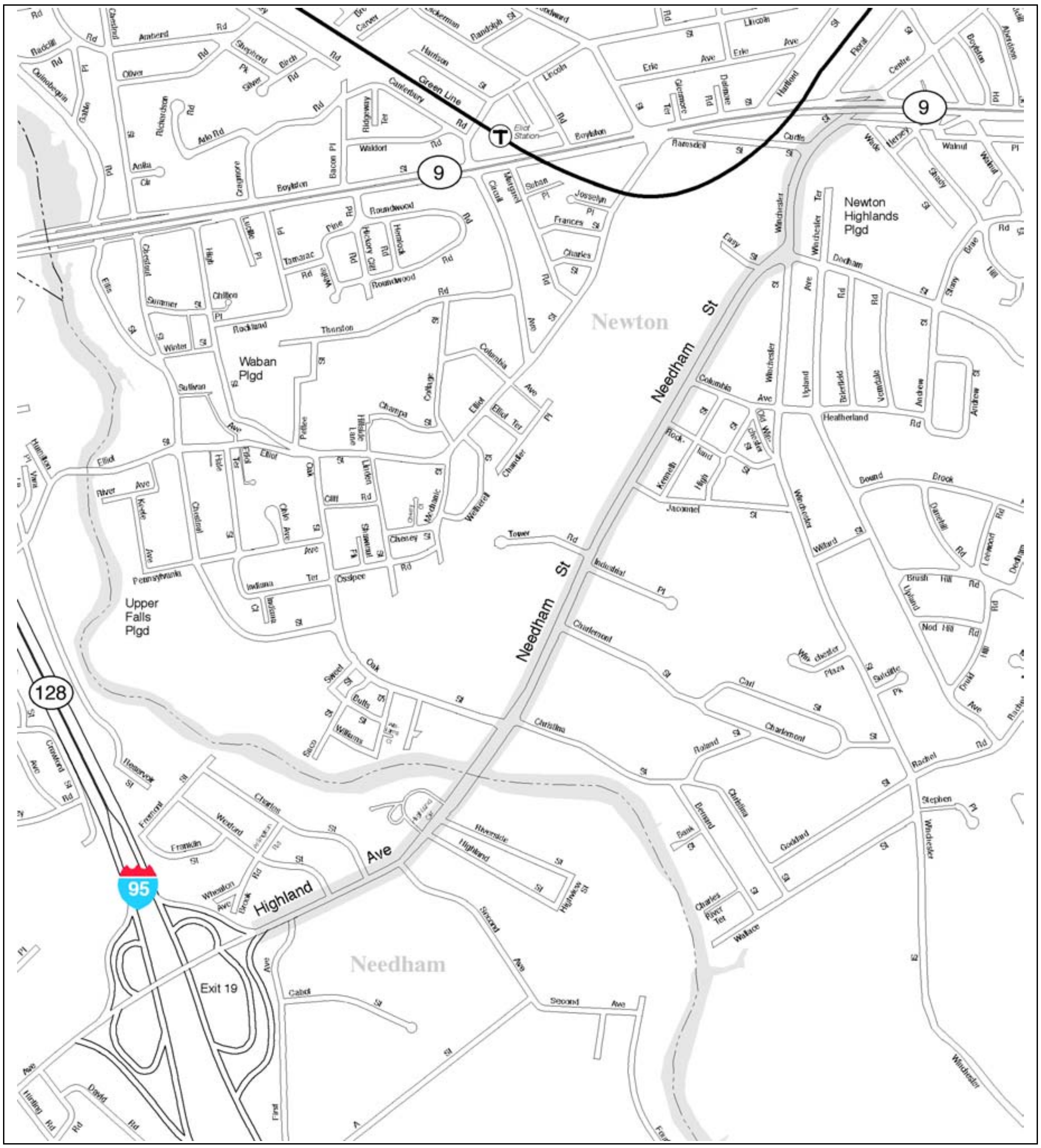
Land Use
There will be no changes in land use as a result of this project; the rail line is currently operating through the project area.

Mobility
This project will improve the capacity and operations of an existing freight facility. Benefits could include the reduction of truck traffic related to the movement of goods from the Port of Boston.

Connectivity
This project will improve rail access to Boston and will make the port more attractive in the highly competitive sea freight market. Its benefits include a probable increase in freight business for the port.

NEEDHAM AND NEWTON: NEEDHAM STREET/HIGHLAND AVENUE ($6,600,000)

Widen Needham Street to a four-lane cross section (two lanes in each direction) from the Needham Street/Winchester Street/Dedham Street intersection in Newton to the bridge over the Charles River at the Needham town line. The Highland Avenue portion of the project will improve the geometry of the roadway from the Highland Avenue/Webster Street intersection in Needham to the Newton town line. Work will include upgrades and the installation of traffic signals at five intersections. The project will also include the reconstruction of the bridge over the Charles River to accommodate the upgrade in travel lanes.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The project area in Newton along Needham Street is zoned as residential from Route 9 north and as mixed-use and multiresidential from Route 9 south to the Needham town line. The project area in Needham is zoned as industrial east of Interstate 93 to the Newton town line and residential west of I-93. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the project area is subject to absolute development constraints, but the area east of I-93 in Needham is designated as a redevelopment district.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- The area is currently developed with low- to medium-density industrial, commercial, and residential uses in both communities, and no undeveloped parcels.
- The area in Needham is designated as a redevelopment district.
- There are several brownfield sites (large sites that are available for infill development) located adjacent to the corridor.
- Neither Newton nor Needham is state-designated as an economically distressed area/economic target area.
- There is no rail transit service in this corridor, but bus route #59 (with 30 minute peak headways) travels along most of Needham Street in Newton.
- Widening the street will make it more difficult for pedestrians and bicyclists to cross without some compensating mitigation.
- Redevelopment opportunities at higher densities appear to be allowed by zoning, and some of those increased trips could use the existing bus service or take advantage of adjacent residential uses (with appropriate sidewalks and crossings). The corridor is mostly auto-dependent, and significant redevelopment could use up most of the additional capacity created by the project.

Safety

This project area includes three high-crash locations—Highland Avenue at I-95, Highland Avenue at Webster Street, and Highland Avenue at Wexford Street—all in Needham. Between 1997 and 1999, the Highland Avenue/I-95 intersection was the site of 197 crashes, of which 119 involved property damage and 78 involved bodily injury. It ranked #46[*] in the list of the state's high-crash

[*] The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

intersections. The Highland Avenue/Webster Street intersection was the site of 39 crashes, of which 24 involved property damage and 15 involved bodily injury. It ranked #864* in the list of the state's high-crash intersections. The Highland Avenue/Wexford Street intersection was the site of 41 crashes, of which 27 involved property damage and 14 involved bodily injury. It ranked #891* in the list of the state's high-crash intersections.

Mobility

According to MassHighway traffic counts performed in 1999 on Highland Avenue west of Gould Street in Needham, the average daily traffic (ADT) was 22,500 vehicles. The ADT on Needham Street south of Tower Road in Newton in 2001 was 25,200 vehicles. According to counts performed as part of the Highland Avenue Corridor Improvements Functional Design Report (FDR) in 2002, the ADT on Highland Avenue east of First Street (just east of I-95 and between the two other count locations) was 36,700 vehicles. Results from the 2001–2002 Congestion Management System monitoring indicate that the average travel speed on both Needham Street and Highland Avenue is 15 mph or less (level of service E/F) along multiple segments of this corridor in the northbound and southbound directions during the AM and PM peak periods.

Economic Opportunities

According to both the Highland Avenue Corridor Improvements FDR and the proposed Stop and Shop Supermarket draft environmental impact report, this project would help facilitate redevelopment occurring along this corridor.

* The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

QUINCY: BURGIN PARKWAY ($18,000,000)

The project creates new ramps at the Route 3/Burgin Parkway interchange. A grade separation for the Burgin Parkway southbound movement (toward Route 3) is proposed over Centre Street. Beginning on Burgin Parkway just south of Penn Street, the outbound roadway will split. Southbound traffic staying left will continue to the existing at-grade intersection at Centre Street. Traffic bearing right and continuing south along Burgin Parkway will pass over Centre Street en route to the Route 3/Route 128/I-93 ramp system. The grade-separated section will provide two travel lanes and will be constructed with a maximum grade of less than 7%. A viaduct section will be constructed over Centre Street. The viaduct will merge with the existing viaduct carrying outbound traffic from the Quincy Adams MBTA station.

A new ramp is proposed from Crown Colony Drive at its intersection with Congress Street that will carry traffic from Centre Street to I-93 north and Route 128. The ramp will join the southbound flow from Burgin Parkway downstream of the MBTA ramp and the Burgin Parkway merge location. Traffic using this ramp will not be required to weave with other traffic using Burgin Parkway, which will minimize traffic weaving conditions on the Route 128/I-93 ramps. A channelized ramp is also proposed to be constructed from northbound Crown Colony Drive to bypass the Crown Colony Drive/Centre Street and Burgin Parkway/Centre Street intersections and connect with southbound Burgin Parkway ramps.

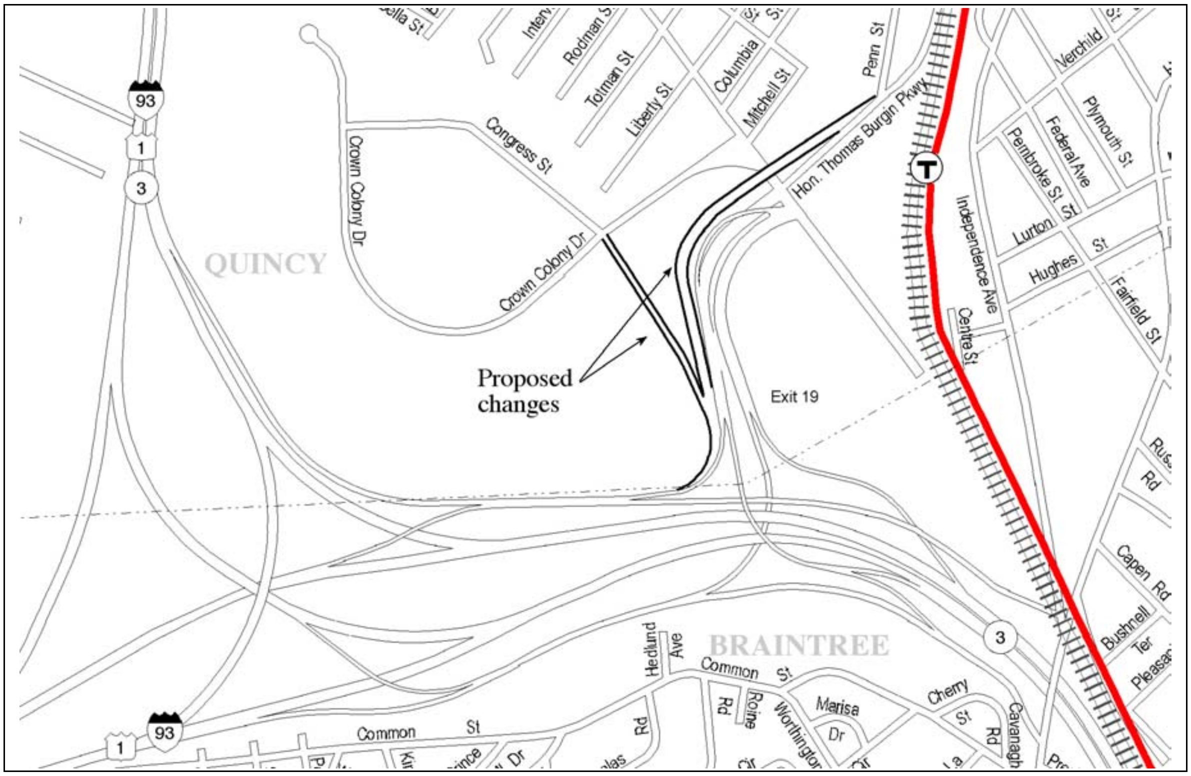
Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The project is located near the intersection of three major highways—Interstate 93, Route 128, and Route 3. The area is zoned for industrial use and consists mainly of commercial, industrial, and office developments. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the area is subject to absolute development constraints.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Uses in the Crown Colony development include medium-density offices and a hotel, as well as industrial. There are other low-density industrial and commercial uses around the Burgin Parkway/Centre Street intersection. There are also residential uses to the north along Centre Street, although their access to the highways will not be significantly improved.
- There are several brownfield sites (large sites that are available for infill development) nearby.



- The city of Quincy is state-designated as an economically distressed area/economic target area.
- The project will significantly improve access to the Crown Colony development area, which will increase the development potential of any remaining parcels.

Safety

This project is located at a high-crash location: between 1997 and 1999, Burgin Parkway at Centre Street was the site of 69 accidents, of which 39 involved property damage, 29 involved bodily injury, and 1 resulted in a fatality. It ranked #263[7] among the state's high-crash intersections.

Mobility

According to the Expanded Environmental Notification Form dated February 2003, the Burgin Parkway/Centre Street intersection functions at level of service (LOS) E in the morning peak period and LOS F in the evening peak period. A ramp weave/merge operations analysis was performed for the southbound Burgin Parkway and MBTA exit ramp to the I-93/Route 128 and southbound

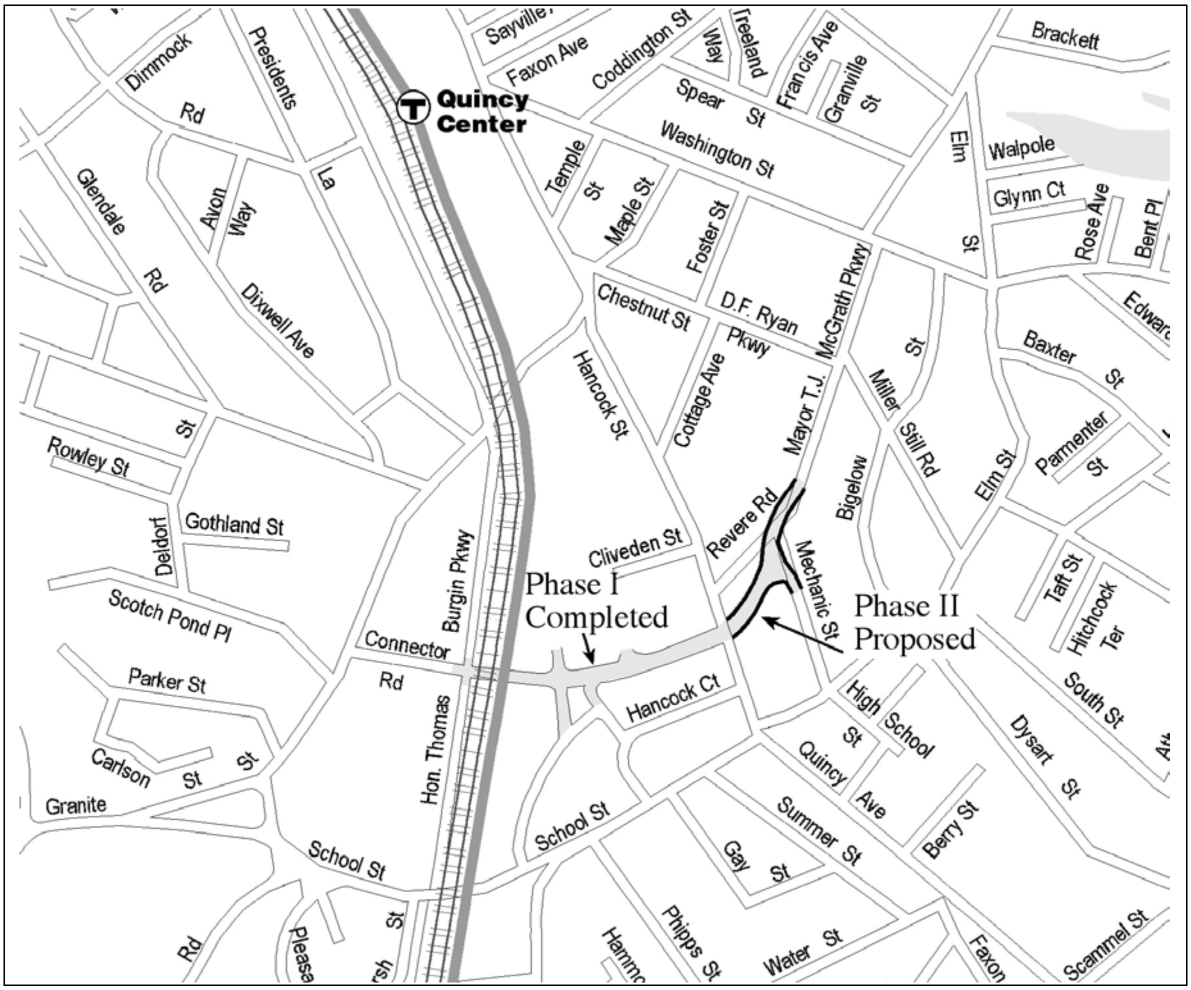
[7] The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

Route 3 ramps. The analysis showed that this weave section of roadway is operating at LOS E during the evening peak period. The project will provide a new overpass that minimizes conflicts for the highest volume traffic movements through the Burgin Parkway/Centre Street intersection: the northbound left-turn movement from the Route 3 ramps onto Centre Street and the southbound movement from Burgin Parkway to Routes 3, 128, and I-93. It will also improve the level of service for the weave mentioned above in both peak periods.

Connectivity
The MBTA's Quincy Adams Red Line station is located at the site of this project. The project has been designed to accommodate traffic entering and exiting the station.

QUINCY: QUINCY CENTER CONCOURSE, PHASE TWO ($6,000,000)

This project continues work from Phase One, which constructed a bridge over the MBTA tracks between Burgin Parkway and Parking Way and a new roadway between Parking Way and Hancock Street. Phase Two of this project consists of the realignment of Revere Road between Hancock Street and Mechanic Street. The new two-lane roadway is proposed as a one-way route in the westbound direction to the intersection of Hancock Street.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
The project area is located in the central business district of Quincy and is zoned for business. According to the Executive Office of Environmental

Affairs/Metropolitan Area Planning Council buildout analysis, the area is subject to absolute development constraints.

Mobility

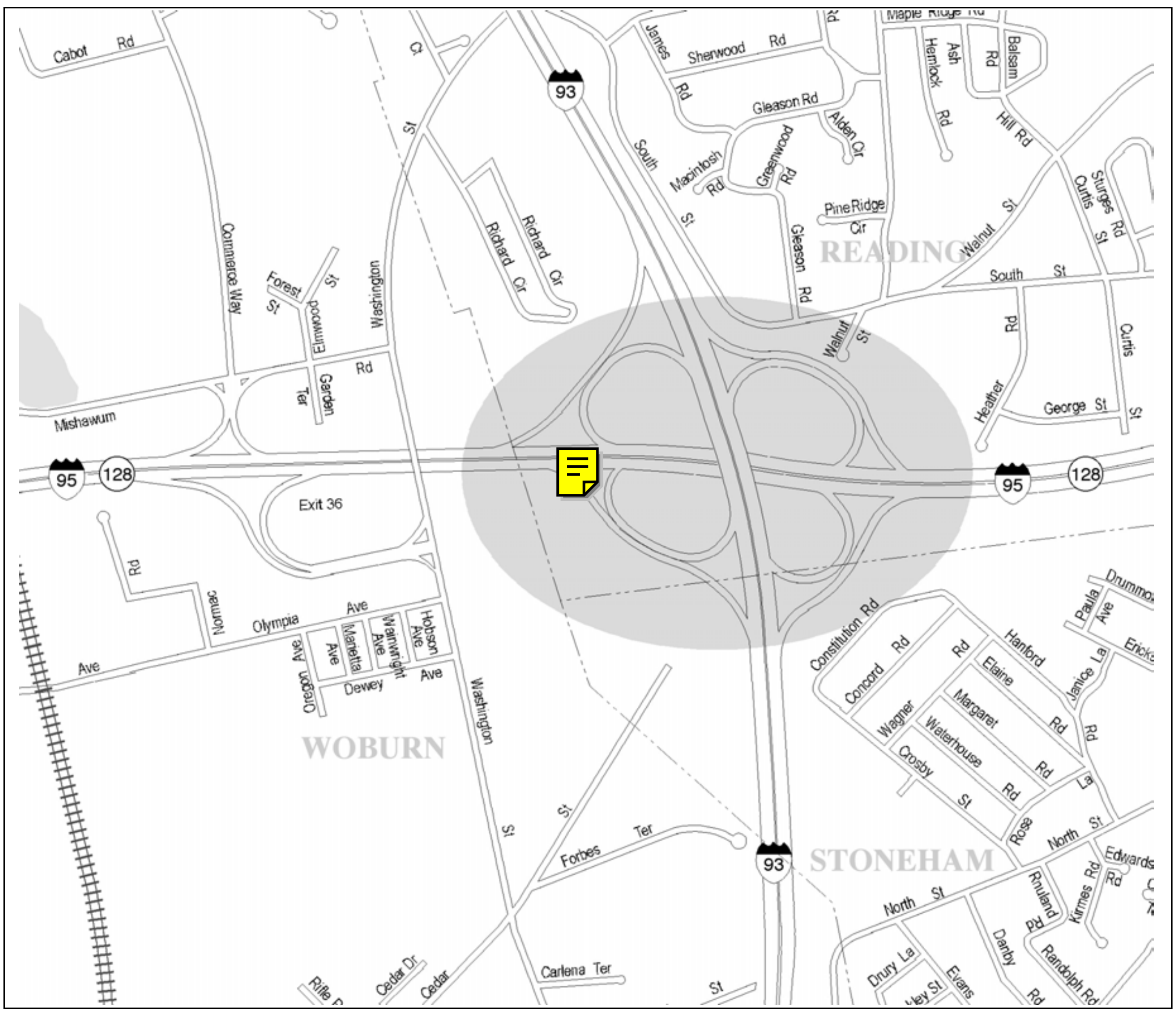
According to the Quincy Center Concourse Traffic Study Report (September 1995), the completion of this entire project will provide a new connection between Burgin Parkway and the Southern Artery (Route 3A) via McGrath Highway. One-way travel lanes for through traffic along Revere Road will allow for greater traffic flow and will allow projected demand to be handled at the intersection of Hancock Street. This project will also align Revere Road with Phase One of the Quincy Center Concourse project.

Notes

The design concept for the project is to balance current traffic and pedestrian demands with the existing urban environment of Quincy. The project is expected to improve access and economic activity within downtown Quincy and not function as a through route. Development of new parcels claimed from the roadway realignment, along with redevelopment of existing parcels, is also expected to occur.

READING AND WOBURN: INTERSTATE 93/INTERSTATE 95 INTERCHANGE
($25,000,000)

Improve safety at the junction of Interstate 93 and Interstate 95. MassHighway is currently working with an advisory task force to conduct a study that will evaluate and address transportation issues in the interchange corridor through the towns of Reading and Stoneham and the city of Woburn. A full range of alternatives, including interchange improvements and non-highway options, will be developed and analyzed as the study progresses. A recommended plan of future transportation improvements (short-term and long-term), based on the alternatives and community input, will be the product of this study.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
Zoning in the project area is residential, industrial, and business. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the majority of the land in the project area in Stoneham and Reading is subject to absolute development constraints. There is one area of future developable land in Stoneham and a larger redevelopment area in Woburn.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Currently the interchange is surrounded by mostly retail uses, with a few other commercial uses and some residences also nearby.
- Since the plans for the final redesign of the interchange and any other connecting roadways are still under development, some of the land use impacts of the project cannot be projected. Takings of residential and commercial properties are possible. Any incorporation of new service roads into the design will allow the redevelopment of several adjacent parcels at higher densities, with increased trips.

Safety
This interchange is a high-crash location—between 1997 and 1999, the I-93/I-95 interchange was the site of 678 crashes, of which 443 involved only property damage and 235 involved bodily injury. It was ranked the #1 high-crash site on the list of the state's high-crash intersections.

Mobility
According to MassHighway traffic counts, the average daily traffic on the interstate highways leading into this interchange is as follows:

I-93 North of I-95 (1998 counts) – 148,800 vehicles
I-93 South of I-95 (2001 counts) – 161,900 vehicles
I-95 East of I-93 (2000 counts) – 153,000 vehicles
I-95 West of I-93 (1997 counts) – 168,300 vehicles

REVERE: MAHONEY CIRCLE GRADE SEPARATION ($25,000,000)

Mahoney Circle (also known as Bell Circle) is a major intersection for local and regional traffic in Revere, accommodating the approaches of Route 1A, Route 60, Route 16, and Beach Street. The preferred alternative for this project will remove the rotary by relocating a portion of Route 1A and depressing Route 60 under Beach Street. Access to local streets will be maintained via direct connections from a newly constructed Beach Street Connector.

The connection of Route 1A and Route 60 will be relocated north of the existing rotary by extending Route 1A west from the vicinity of Butler Circle to Route 60 on an alignment just south of the newly constructed Comfort Inn Suites hotel. The connection between Route 1A southbound and Route 60 northbound would be a standard right-lane merge under yield conditions, while the connection to Route 60 southbound will be a fully signalized left turn. Just south of this connection, the right lane will split off from Route 60 to provide a direct connection to Beach Street west of the current rotary. Going north on Route 60, two lanes of traffic will split off at the new traffic signal to provide direct access to Route 1A northbound, while two lanes will continue as Route 60 northbound.

Route 60 will be depressed under Beach Street from the vicinity of Everett Street to where Route 16 eastbound connects to Route 1A. The depressed section of Route 60 will provide two southbound lanes and two northbound lanes with a lane added between Route 16 eastbound to Route 60 northbound. The depressed section will be wide enough to allow for an added lane in each direction in the future. Access to the existing businesses and potential business parcels will be provided from relocated Route 1A via ramps in the vicinity of existing Everett Street. Local traffic will access the business parcel south of relocated Route 1A via a curb cut on Beach Street.

The Beach Street Connector will connect the section of Beach Street west of the depressed section of Route 60 to relocated Route 1A. Beginning at the bridge over Route 60, the connector will follow the current alignment of Route 1A to an intersection with Beach Street and will proceed directly north to a signalized intersection with relocated Route 1A just east of the MBTA commuter railroad. Kimball Street will be extended to intersect with the Beach Street Connector.

Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The zoning in the project area is general residential (8,000 square-foot lots) west of Bell Circle, general industrial and industrial park north of the Circle, and general business and high-rise mixed-use zones east of circle. According to the

Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, land in the Mahoney Circle area is subject to absolute development constraints.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Existing adjacent land use is mostly residential (high density), with some industrial and commercial uses. There appears to be developable industrial land just east of the new Comfort Inn Hotel.
- There are no brownfield sites (large sites that are available for infill development) nearby.
- Revere is state-designated as an economically distressed area/economic target area.
- The project is just under one-half mile from the Revere Beach MBTA station, and should include improved bicycle and pedestrian connections between previously separated sections of Revere. The land made available by the grade-separation could be available for park use, and the project could allow some mixed-use redevelopment to occur nearby.
- The proposed roadway configuration will divide a parcel currently zoned general industrial that is adjacent to a newly constructed hotel into at least two additional parcels, each one with the potential for commercial/industrial development. Currently, there are no known plans for redevelopment of this area by the city or by the landowner. Road designs that include a connection between Route 1A and Route 60 have been preempted by the location of a hotel in the site proposed for the connector. Plans for the project will have to be rethought in light of this action.

Safety

This project is located at a high-crash location—between 1997 and 1999, Mahoney Circle was the site of 243 accidents, of which 130 involved property damage and 113 involved bodily injury. It ranked #15 on the list of the state's high-crash intersections.

Mobility

MassHighway traffic counts show that average daily traffic volumes on the two commuter routes north of Mahoney Circle are approximately 40,000 on Route 60 and 29,000 on Route 1A. To the south, the average daily traffic on Route 1A is 50,000 and on Revere Beach Parkway is 20,000. According to the Mahoney Circle Grade Separation Feasibility Study (June, 1997), the approaches to Mahoney Circle operate at a relatively uniform level of service (LOS) D during the AM peak hour. During the PM peak hour, some approaches remain at LOS D, but the Route 1A northbound and Route 16 northbound approaches operate at a LOS F. In terms of delay, this intersection is tentatively rated as the twelfth most delayed

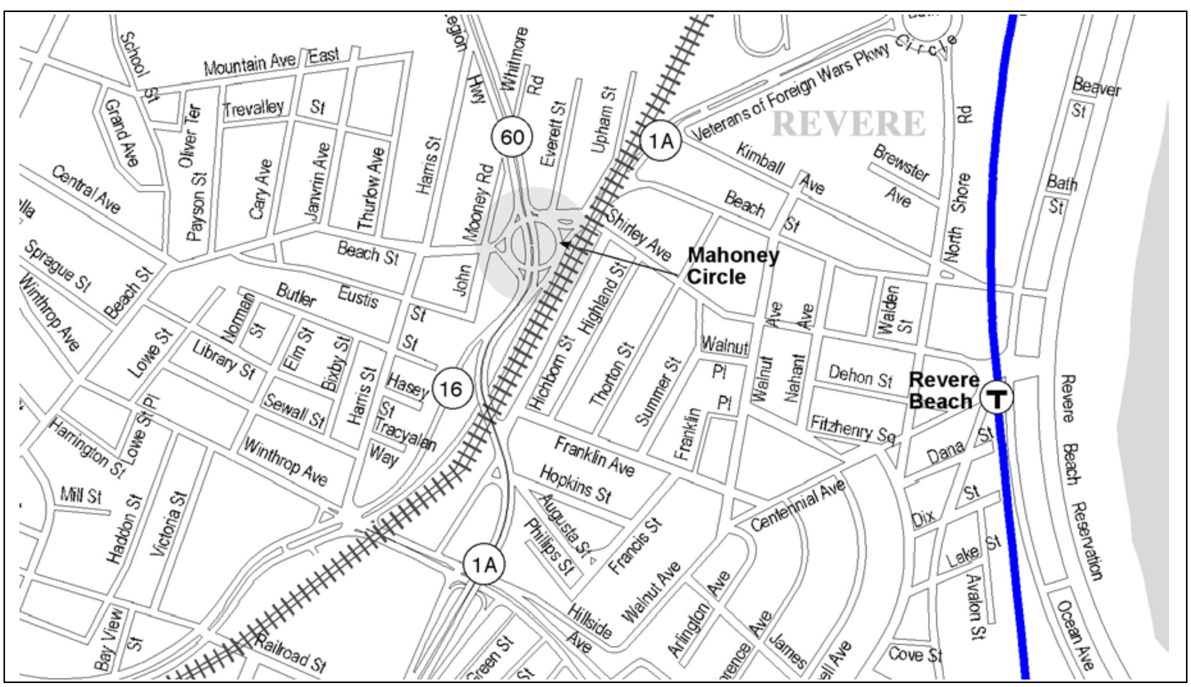
intersection in the Inner Core subregion and the eighteenth most delayed intersection for the entire region (source 2001 Congestion Management System monitoring).

Environmental Justice
The MPO has identified this area of Revere as an environmental justice community of concern. This project will ease a burden on the community by moving regional trips from the local roadways.

Notes

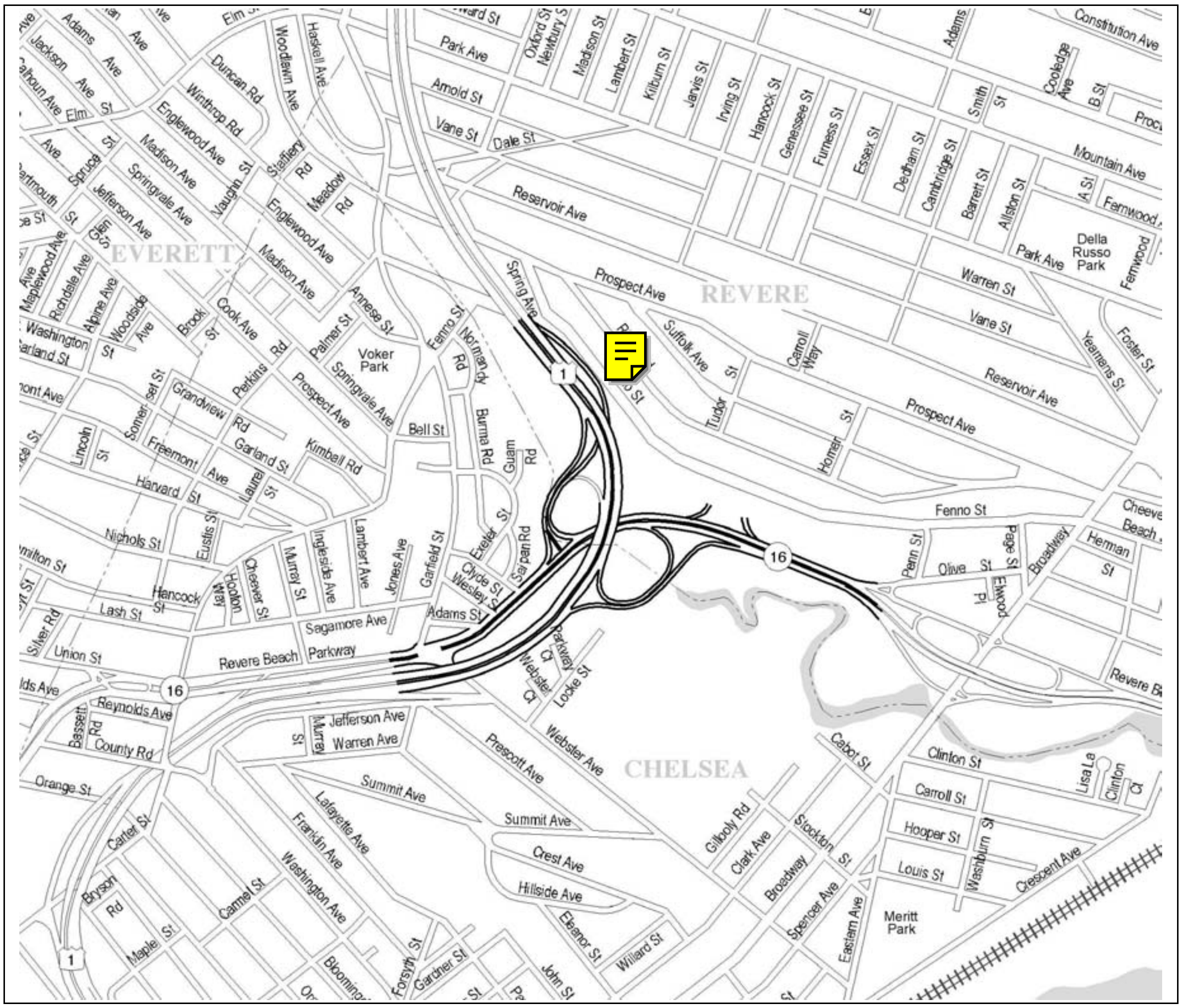
MassHighway is currently preparing a draft environmental impact report and Environmental Assessment for this project and anticipates a submittal to the Federal Highway Administration in 2003.

This project is in close proximity to the Route 1A/Route 16 connection project. The two projects will allow a direct connection between Routes 1 and 1A via Route 16, eliminating the need for regional traffic to utilize local streets. Both of these projects are components of a Lower North Shore transportation improvement scheme that includes the widening of Route 1A from four lanes to six lanes between Curtis Street (north of Logan Airport) and Mahoney Circle in Revere; creating a direct express highway connection between Route 1A north of Logan Airport and the Chelsea Street Bridge to Chelsea; and grade separating the intersection of Route 1A with Route 60 at Mahoney Circle in Revere.



REVERE: ROUTE 1/ROUTE 16 INTERCHANGE ($3,900,000)

Provide a direct connection from Route 1 southbound to Route 16 eastbound and from Route 16 (Revere Beach Parkway) westbound to Route 1 northbound. The improvements include a signalized double left-turn from Route 1 southbound onto Route 16 eastbound and a standard on-ramp from Route 16 westbound to Route 1 northbound.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The project area is primarily zoned for residential use in both the City of Revere and the City of Chelsea. Chelsea's Parkway Plaza redevelopment district is located to the southeast of the proposed connection. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the area around the interchange is subject to absolute development constraints in Chelsea and partial development constraints in Revere.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- There are mostly residential uses surrounding the site, with a medium-size mall (Parkway Plaza Shopping Center) just across Route 16 to the south.
- Brownfield sites (large sites that are available for infill development) are located close to the project area.
- Revere is state-designated as an economically distressed area/economic target area.
- The land use in the area is already built up, and there are no known plans for redevelopment in the area.
- The project provides only minor improvements to local access, but it will improve regional connections.

Safety

This project is located at a high-crash location—between 1997 and 1999, Route 1 at Route 16 has been the site of 85 crashes, of which 43 involved property damage and 42 involved bodily injury. As such, it ranked #154[8] on the list of the state's high-crash intersections.

Mobility

The Route 1 corridor is a major north-south transportation connection in the lower North Shore area. According to MassHighway's 1998 traffic counts, the average daily traffic along Route 1, half a kilometer north of Sargent Street, was 54,600 vehicles. According to the Lower North Shore Transportation Improvement Study conducted by CTPS in 2000, the Route 1/Route 16 connection will improve mobility for Route 1A, Route 107, and Route 1 traffic by providing an upgraded east-west connection along Route 16.

Environmental Justice

The MPO has identified this area of Revere as an environmental justice community of concern. This project will ease a burden on the community by moving regional trips from the local roadways.

Note

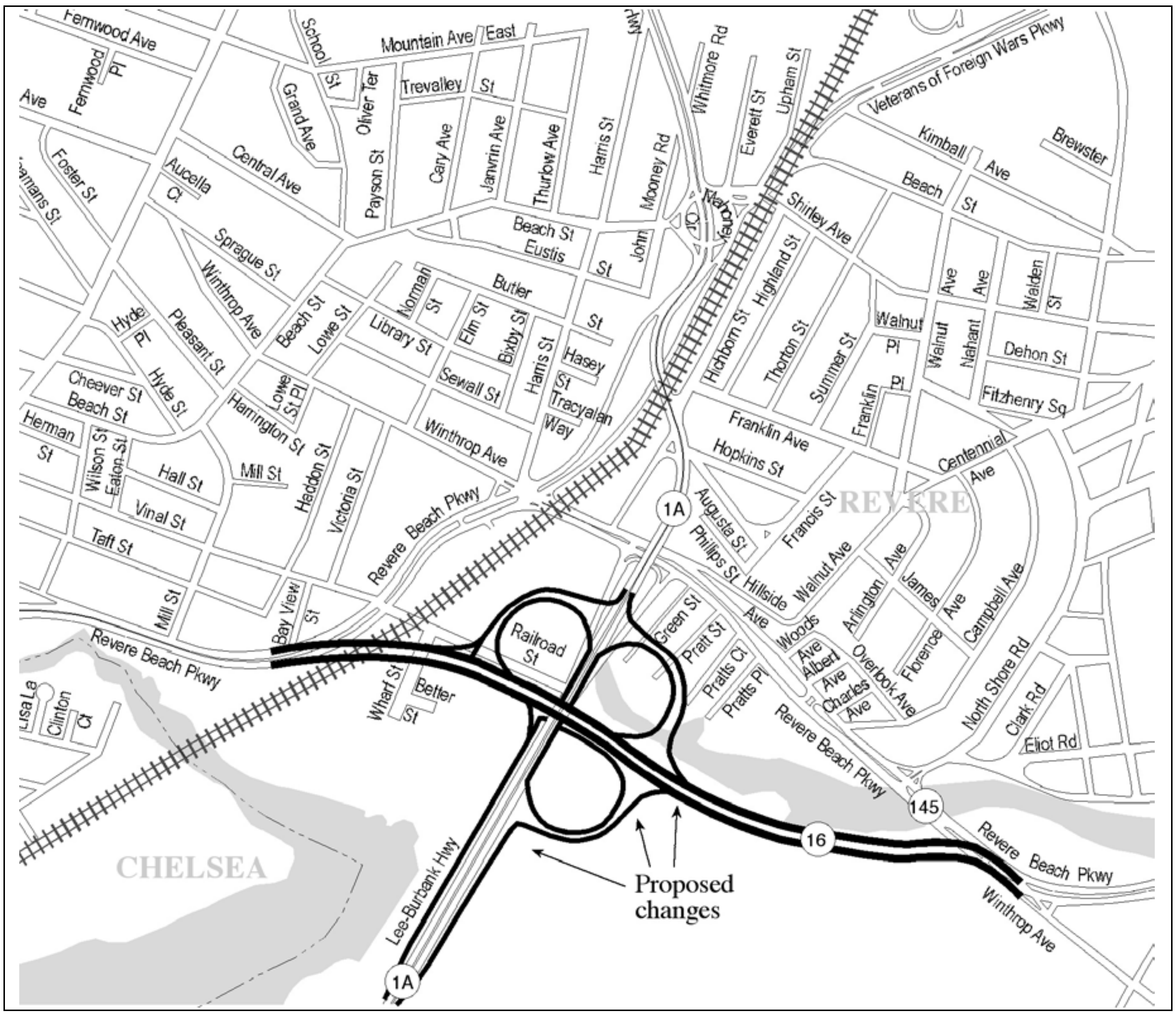
This project is in close proximity to the Route 1A/Route 16 connection project. The two projects will allow a direct connection between Routes 1 and 1A via Route 16, eliminating the need for regional traffic to utilize local streets. Both of these projects are components of a Lower North Shore transportation improvement scheme, which includes the widening of Route 1A from four lanes

[8] The MPO safety ranking of this intersection is different from the official MassHighway ranking due to a different numbering system.

to six lanes between Curtis Street (north of Logan Airport) and Mahoney Circle in Revere; creating a direct express highway connection between Route 1A north of Logan Airport and the Chelsea Street Bridge to Chelsea; and grade-separating the intersection of Route 1A with Route 60 at Mahoney Circle in Revere.

REVERE: ROUTE 1A/ROUTE 16 CONNECTION ($39,600,000)

Realign Route 16 (Revere Beach Parkway) and its junction with Route 1A to the south, placing a 3/4 cloverleaf interchange at the northwest corner of Suffolk Downs. A new signal will be installed on Route 16 providing left turns from Route 1A southbound to Route 16 eastbound. A traffic signal will be installed at the intersection of Route 16 and Winthrop Avenue (Route 145) and the current alignment of Route 16 will be closed north of Route 145 and be converted into a linear park.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The project area is zoned for a variety of land uses—residential, general business, and industrial. The project is adjacent to the Suffolk Downs Redevelopment District. According to the Executive Office of Environmental

Affairs/Metropolitan Area Planning Council buildout analysis, the project area is subject to absolute development constraints.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Currently there are mostly highway commercial uses along the Route 1A corridor, along with the Suffolk Downs Race Track. With improved access, it is expected that many of these properties will be redeveloped into office, commercial, or residential use.
- Future development assumptions for the Suffolk Downs Redevelopment district: 50% 6-floor office, 25% 1-Floor manufacturing, 15% 6-floor apartments, and 10% 8-floor hotels.
- Brownfield sites (large sites that are available for infill development) are located close to the project area.
- Revere is state-designated as an economically distressed area/economic target area.

Mobility
Route 1A is a high-usage corridor from the North Shore to Logan International Airport and Downtown Boston. According to MassHighway traffic counts, average daily traffic (ADT) along Route 1A at the Boston city line in the year 2000 was 51,800 vehicles. The ADT on Route 16 south of Mahoney Circle in 1997 was 17,500 vehicles. Results from the 2001 Congestion Management System monitoring indicate that the average travel speed on Route 16 at Route 1A is 15 miles per hour or less, which is level of service (LOS) E/F in the westbound and eastbound directions in the PM peak period. The travel speed at this location is below 70% of the posted speed in the westbound and eastbound directions in both the AM and PM peak periods. The average travel speed on Route 1A at Route 16 is also 15 miles per hour or less (LOS E/F) in the southbound direction in the AM and PM peak periods. The travel speed at this location is below 70% of the posted speed in the southbound direction in both the AM and PM peak periods.

Environmental Justice
The MPO has identified this area of Revere as an environmental justice community of concern. This project will ease a burden on the community by moving regional trips from the local roadways.

Note

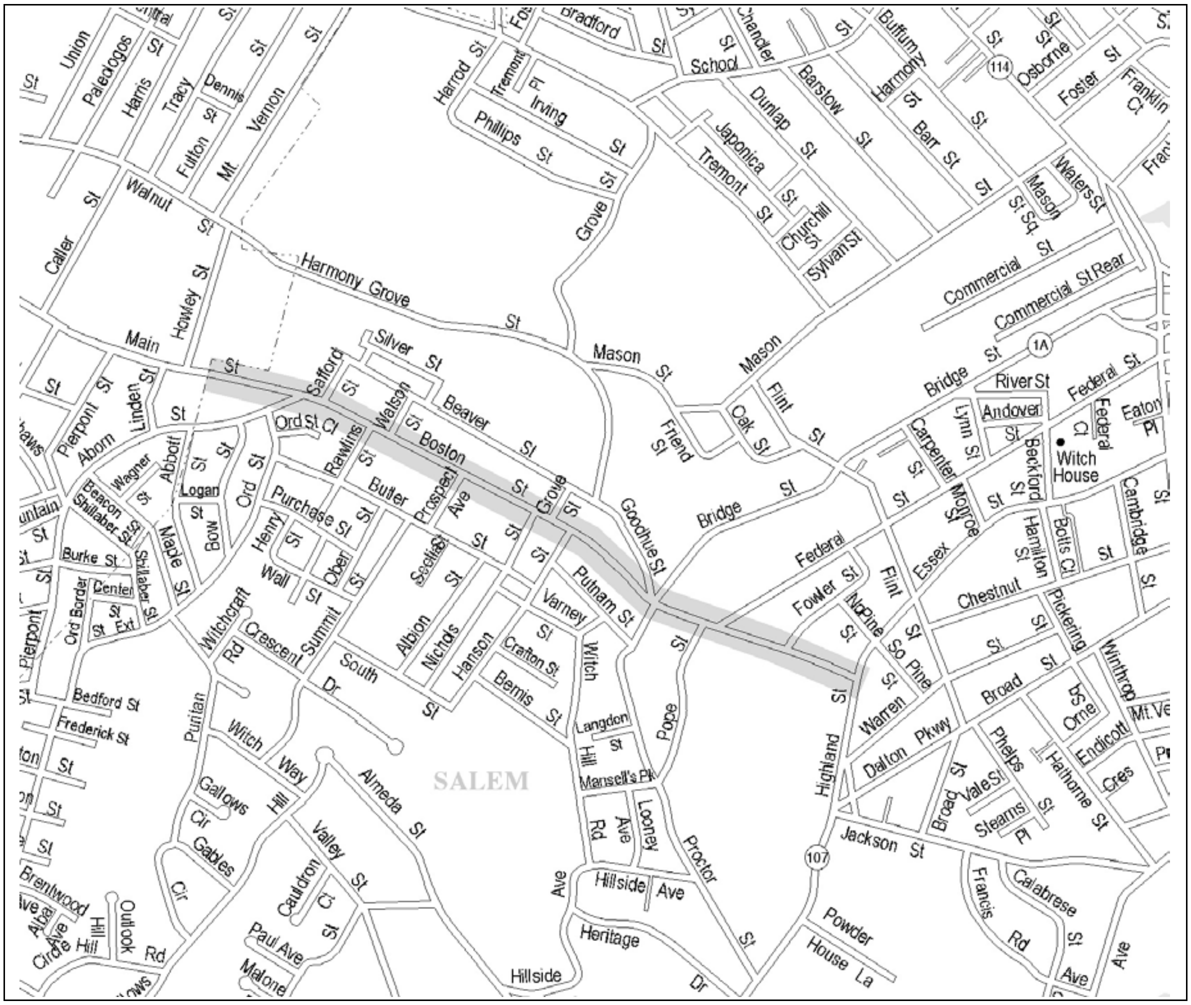
According to the Lower North Shore Transportation Improvement Study (October 2000), a new connection between Route 1A and Route 16 (Revere Beach Parkway) will accomplish three objectives:

- Improve connections between the tunnels and Logan Airport and Route 1, using Route 1A and Route 16 (to be successful, improving these also requires an improved connection between Route 1 and Route 16)
- Provide a gateway to Revere Beach
- Move Route 16 traffic away from Mahoney Circle

This project is in close proximity to the Route 1/Route 16 connection project. The two projects will allow a direct connection between Routes 1 and 1A via Route 16, eliminating the need for regional traffic to utilize local streets. Both of these projects are components of a Lower North Shore transportation improvement scheme that includes: widening Route 1A from four lanes to six lanes between Curtis Street (north of Logan Airport) and Mahoney Circle in Revere; creating a direct express highway connection between Route 1A north of Logan Airport and the Chelsea Street Bridge to Chelsea; and grade-separating the intersection of Route 1A with Route 60 at Mahoney Circle in Revere.

SALEM: BOSTON STREET ($2,000,000)

Boston Street will be widened to three lanes between Route 107 and the Peabody city line to include a center turning lane.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

This corridor of Boston Street is zoned for highway business and residential uses. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the project area is subject to absolute development constraints.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Land use in the project area includes two-family housing on 15,000 square-foot lots and one-story retail. The business park development district (mostly

industrial, and available for redevelopment) is nearby. The intersection of Boston and Bridge Streets is zoned as business park development (75% three-story office, and 12.5% warehouse, 12.5% industrial uses).

- There are multiple brownfield sites (large sites that are available for infill development) nearby.
- Salem is state-designated as an economically distressed area/economic target area.
- Widening to three lanes via a center turn lane should allow better access to existing properties, but any redevelopment that significantly increases the number of trips to a site will probably require additional improvements at the site driveway.

Safety

This project includes two high-crash locations— Boston Street/Bridge Street and Boston Street/Essex Street. Between 1997 and 1999, the Boston Street/Bridge Street intersection was the site of 56 crashes, of which 40 involved property damage and 16 involved bodily injury. It ranked #627[*] on the list of the state's high-crash intersections. The Boston Street/Essex Street intersection was the site of 51 crashes, of which 36 involved property damage and 15 involved bodily injury. It ranked #715[*] on the list of the state's high-crash intersections.

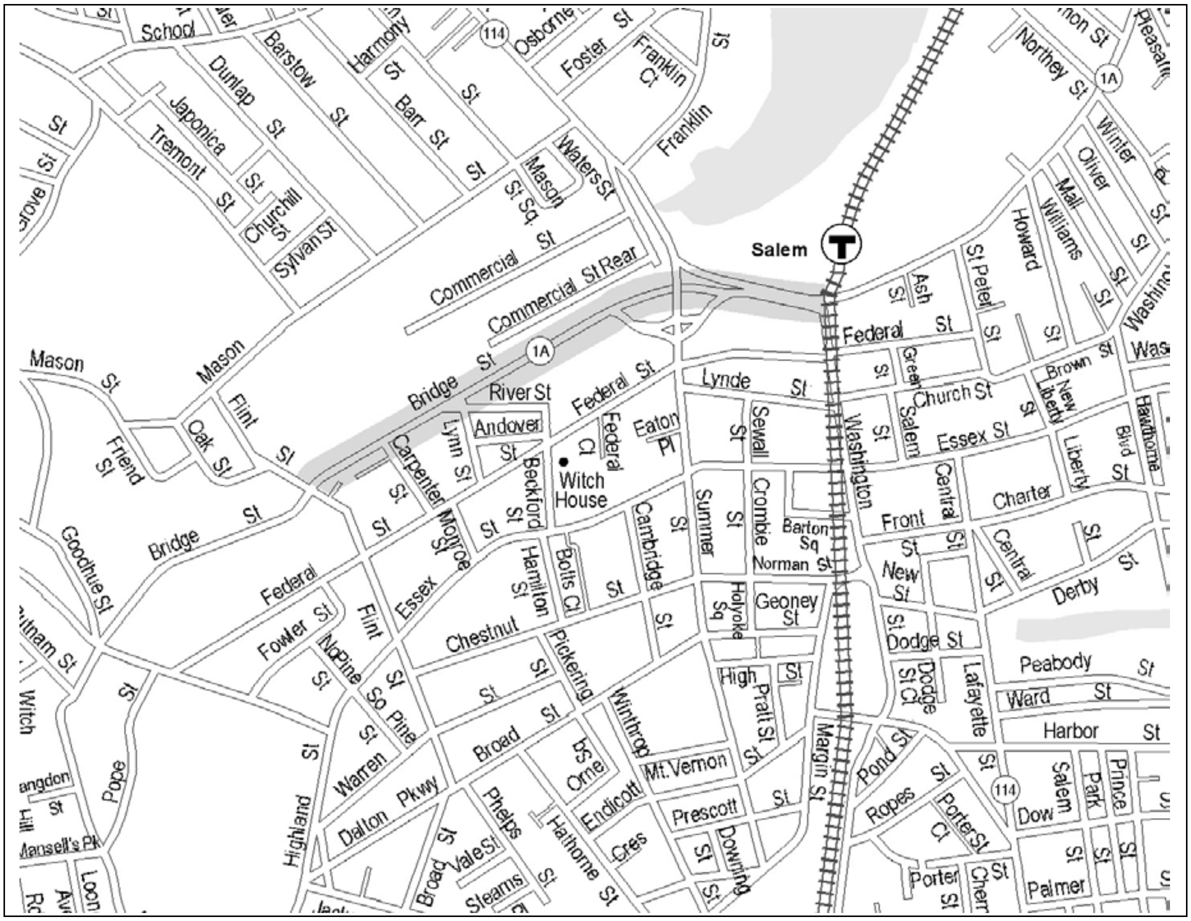
Mobility

According to the 2001/2002 Congestion Management System (CMS), the lowest speed delay captured by CMS monitoring is at Route 107 and Boston Street, where the average PM speed in the southbound direction is 9 mph. This speed is 70% less than the posted speed. Average PM delay in the southbound direction is 70 seconds.

[*] The MPO safety ranking of this intersection is different from the official MassHighway ranking due to a different numbering system.

SALEM: BRIDGE STREET ($3,000,000)

Bridge Street from Flint Street to the Washington Street Rotary will be widened to two lanes in each direction. The project will also include the reconstruction of the Washington Street rotary.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

This area of Bridge Street is zoned business park development and business central development. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the project area is subject to partial development constraints to the north of Bridge Street and absolute development constraints to the south. There are no designated redevelopment districts in the corridor.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- The MBTA commuter rail station is opposite the intersection of St. Peter Street and Bridge Street, as well as newly developed apartments/condominiums (five six-story buildings). The eastern side of Bridge Street is developed as two-family housing. The western side of Bridge Street (across the North River) has industrial uses (zoned as business park development).
- There is a brownfield site (a large site that is available for infill development) nearby.
- Salem is state-designated as an economically distressed area/economic target area.
- The project will improve access to the Salem commuter rail station and to an already densely developed area.

Safety
This project includes two high-crash locations—Bridge Street/North Street and Bridge Street/Washington Street. Between 1997 and 1999, the Bridge Street/North Street intersection was the site of 79 crashes, of which 46 involved property damage, 32 involved bodily injury, and 1 resulted in a fatality. It ranked #211[*] on the list of the state's high-crash intersections. The Bridge Street/Washington Street intersection was the site of 53 crashes, of which 41 involved property damage and 12 involved bodily injury. It ranked #833[*] on the list of the state's high-crash intersections.

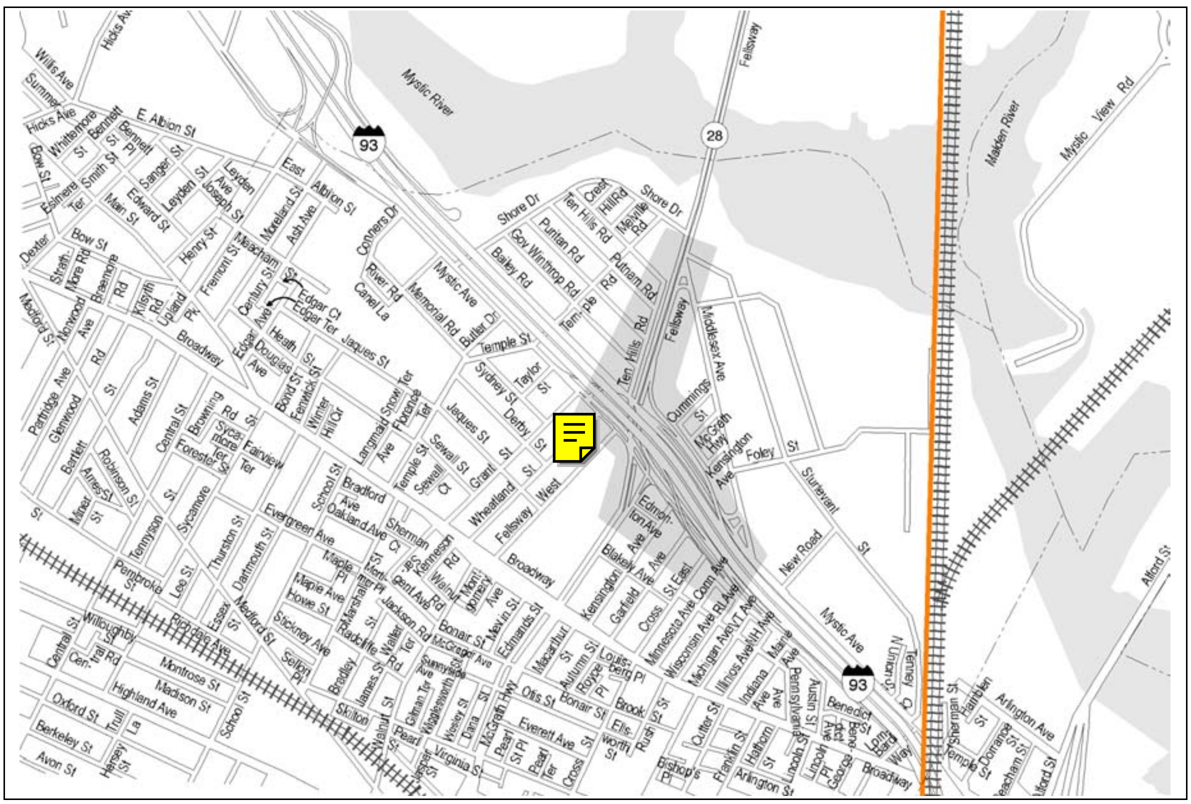
Mobility
According to MassHighway traffic counts, the average daily traffic on Bridge Street north of Flint Street is 17,800 vehicles (2001 figures).

Connectivity
The Salem commuter rail station is located in the vicinity of the project. The MBTA is working to expand parking at this commuter rail station. All MBTA buses that operate in Salem connect at this commuter rail station. The Bridge Street project will improve access to this site and, as envisioned, will enhance pedestrian access on Bridge Street and at the Washington Street rotary.

[*] The MPO safety ranking of this intersection is different from the official MassHighway ranking due to a different numbering system.

SOMERVILLE: INTERSTATE 93/MYSTIC AVENUE INTERCHANGE ($50,000,000)

Construct a new underpass grade separating Route 28 northbound and convert the existing underpass to the exclusive use of Route 28 southbound. In addition, a new connector road will be constructed between Mystic Avenue and Middlesex Avenue and the Interstate 93 northbound off-ramp will be reconstructed to permit the connector road access to the Assembly Square Mall area. The Route 28 surface street system will operate in a one-way rotary style system controlled by four coordinated traffic signals—one more than currently exists. Three other locations would also be coordinated with the four signals mentioned above: the Route 28/Assembly Square Mall entrance, the Mystic Avenue/Wheatland Street intersection, and the Middlesex Avenue/Assembly Square Connector.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
The project is located next to one of Somerville's central business districts. The northeast quadrant is designated as the Assembly Square Redevelopment District. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, this area is mostly built out and subject to absolute development constraints.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Existing land uses are primarily high-density residential (two- and three-family homes on small lots) north and west of the Interstate 95/Route 28 interchange, with a large park abutting Route 28. Low-density retail and entertainment uses, a hotel, and a small multi-story office building, and several large parcels awaiting redevelopment are located on the south and east sides of the interchange. Existing zoning is residential and commercial, with the Assembly Square district currently being rezoned to allow/encourage high-density/mixed use development.
- Assembly Square is a large brownfield site (a large site that is available for infill development).
- Somerville is state-designated as an economically distressed area/economic target area.
- The current interchange provides indirect or unsafe access to most of the existing land uses. Any redevelopment of the area will require improved access at this interchange to be successful. Without a new transit station (see "Connectivity" below), all site access will be via automobile, and most of the capacity/access improvements of this project will be used up before the sites are built out to their potential capacity.

Safety

This project is located at a high-crash location—between 1997 and 1999, Route 28 at I-93 has been the site of 415 crashes, of which 232 involved property damage, 182 involved bodily injury, and one involved a fatality. It ranked #4 on the list of the state's high-crash intersections. According to the Mystic Avenue/Route 28/I-93 Interchange Improvement Study conducted by CTPS in 1994, the design of this project will eliminate short weaving and merging conflicts and improve sight distance and channelization.

Mobility

According to the Mystic Avenue/Route 28/Interstate 93 Interchange Improvement Study, the Route 28/Mystic Avenue southbound and the Route 28/Broadway intersections function at level of service F in the morning peak period. According to MassHighway traffic counts performed in 1995, the average daily traffic on Mystic Avenue north of Route 28 was approximately 40,000 vehicles, and on Route 28 south of Mystic Avenue it was 65,000 vehicles.

Connectivity

The I-93/Mystic Avenue Interchange project is located at the intersection of two major roadways in the region and is serviced by three MBTA bus routes that access the MBTA's Sullivan Square Orange Line station and/or the Wellington

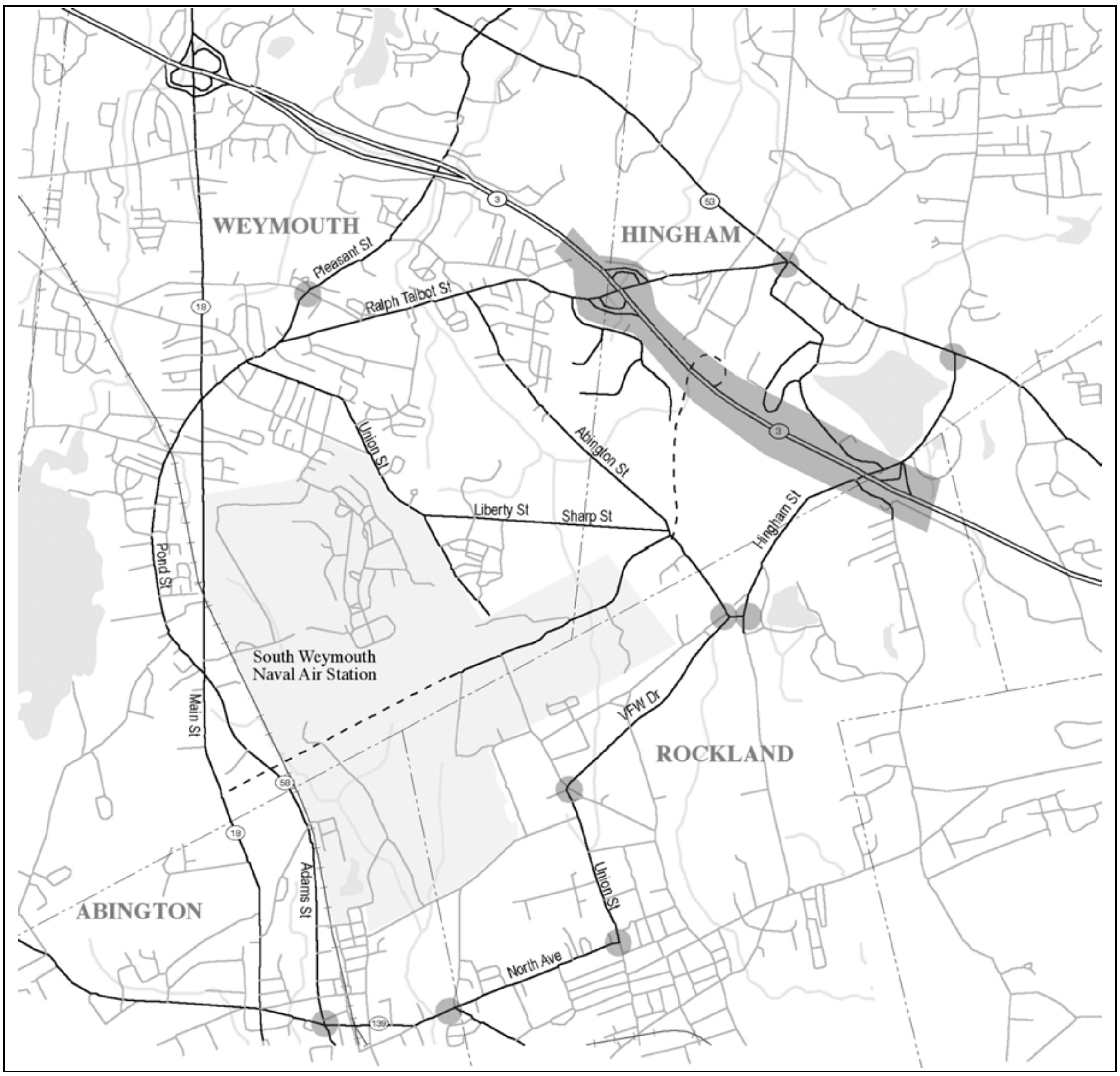
Orange Line station. This improvement project is adjacent to the proposed Assembly Square Station project (the construction of an Orange Line station between Sullivan Square and Wellington stations), which is included in the current 2000 Boston Regional Transportation Plan.

Economic Opportunities
The Assembly Square Redevelopment District is located in the vicinity of this project and has recently become the focus of proposed commercial development by the City of Somerville and private developers.

Note
The Central Transportation Planning Staff is conducting a corridor study of Route 28 from Route 16 in Medford to Land Boulevard in Cambridge. This interchange is included within the scope of study.

WEYMOUTH, ABINGTON, HINGHAM, AND ROCKLAND: SOUTH WEYMOUTH NAVAL AIR STATION ACCESS IMPROVEMENTS ($74,700,000)

This project will make improvements to the regional transportation system in the vicinity of the former South Weymouth Naval Air Station (an area that includes the towns of Weymouth, Abington, Hingham, and Rockland). The project includes roadway and interchange capacity improvements to Route 3 between Exit 14 to Exit 15, improvements to local intersections, and widening Hingham Street (Route 228), as well as construction of a new connector roadway through the site of the former Naval Air Station and other properties from Route 3 in Hingham to Route 18 in Abington.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
Tri-Town is responsible for the redevelopment of the 1,400-acre former South Weymouth Naval Air Station. Current planning identified in the Final Base Reuse Plan adopted in 1998 by the towns of Abington, Rockland, and Weymouth, calls for mixed-use development on the site (up to 3.5 million square feet of retail use and office/research and development; up to 700 units of senior housing; 100,000 square feet of institutional use; and a 190-acre golf course), all staged to coincide with completion of the access improvements. Over 60% of the entire site will be allotted to open space and recreational uses (park and recreation, wetlands, and open space).

The project area (the redevelopment site and the surrounding communities including the locations of the access improvements) includes areas of significant commercial and industrial land uses, including shopping centers, an industrial park, a hospital, and commercial corridors on roadways in the vicinity. There are also large areas of suburban, low- and medium-density residential development around the former Naval Air Station.

Safety
Between 1997 and 1999, the two interchanges and three of the intersections at which improvements are planned were classified as high-crash locations: Derby Street and Route 3 (Exit 15); Hingham Street (Route 228) and Route 3 (Exit 14); Whiting Street (Route 53) and Gardner Street; Whiting Street (Route 53) and Main Street (Route 228); Adams Street (Route 58) and North Avenue (Route 139).

- Route 3/Derby Street intersection (Hingham) was the site of 83 crashes, of which 41 involved property damage and 42 involved bodily injury. It ranked # 156* on the list of the state's high-crash intersections.
- Route 3/Hingham Street (Route 228) intersection (Rockland) was the site of 90 crashes, of which 54 involved property damage and 36 involved bodily injury. It ranked # 179* on the list of the state's high-crash intersections.
- Whiting Street (Route 53)/Gardner Street intersection (Hingham) was the site of 49 crashes, of which 30 involved property damage and 19 resulted in injuries. It ranked # 583* on the list of the state's high-crash intersections.

* The MPO safety ranking of this intersection is different from the official MassHighway ranking due to a different numbering system.

- Whiting Street (Route 53)/Main Street (Route 228) intersection (Hingham) was the site of 46 crashes, of which 27 involved property damage and 19 resulted in injuries. It ranked # 614* on the list of the state's high-crash intersections.
- Adams Street (Route 58)/North Avenue (Route 139) intersection (Abington) was the site of 38 crashes, of which 22 involved property damage and 16 resulted in injuries. It ranked # 818* on the list of the state's high-crash intersections.

Mobility

The connector road will provide an additional link between Route 3 and Route 18, the region's two major north/south roadways, as well as an alternative access route to the redevelopment site. The connector road will also provide an additional link to the South Weymouth commuter rail station on the Plymouth Line, which is located on Route 18.

Connectivity

Tri-Town is working with the MBTA to explore several concepts for transit amenities, including additional parking at the South Weymouth commuter rail station and development of a multimodal transit center linking rail, public and private bus services in the region, perhaps bus service to the Red Line in Braintree, and the Logan Express. The developer is considering electric shuttle bus service to link the station with work sites.

Economic Opportunities

The South Shore Tri-Town Development Corporation estimates that the development will result in 9,000 new jobs. The South Weymouth Access Study also estimates that jobs in neighboring towns will increase by approximately 6,600. Secondary employment growth is estimated at 8,500 above Metropolitan Area Planning Council and Old Colony Area Planning Council projections for 2020.

* The MPO safety ranking of this intersection is different from the official MassHighway ranking due to a different numbering system.

WEYMOUTH: ROUTE 18 CAPACITY IMPROVEMENTS PROJECT ($16,000,000)

Widen Route 18 to two continuous lanes in each direction (with four-foot shoulders) between Route 3 in Weymouth and Route 139 in Abington. Sidewalks will also be constructed. The Route 18 bridge over the MBTA Old Colony Line (to Plymouth) will be reconstructed and widened.

Intersection improvements (including additional left- and right-turn lanes and some roadway widening between intersections) at West Street, Park Avenue, Columbian Road, and Pond and Pleasant Streets are being constructed as separate projects.

Project's Context/Possible Impacts, by MPO Policy Area

Land Use

Zoning along the Route 18 corridor in Weymouth includes residential, highway transition, medical services (the South Shore Hospital and other related medical facilities), limited business, and general business. Zoning along Route 18 in Abington is industrial or highway commercial. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the project area is subject to absolute development constraints in Weymouth and Abington. The South Weymouth Naval Air Station is an area designated for redevelopment by state legislation and by the communities in which it is located.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Route 18 served as the main gateway to the former South Weymouth Naval Air Station site. The redevelopment plan for the site is still under discussion.
- The Naval Air Station site is a brownfield site (a large site that is available for infill development).
- Weymouth is state-designated as an economically distressed area/economic target area.
- The existing South Weymouth commuter rail station is located just off Route 18, immediately across from the Naval Air Station site. Widening of this congested corridor will promote easier access to the station. The increased roadway capacity will also encourage, and may be necessary for, any redevelopment at the Naval Air Station to take place. Almost all of the proposed uses of the Air Station will generate trips that will use up the additional capacity–the proposed high-density mixed-use alternatives should allow some of the trips to be diverted to alternative modes and off of Route 18. Improved access to and from the Naval Air Station site on local roads, if

allowed, would also help to maintain the some of the increased road capacity from the proposed Route 18 improvements.

Safety
This project area includes four high-crash locations—Route 18/Route 3, Route 18/Pond Street, Route 18/Middle Street, and Route 18/Park Avenue —all in Weymouth. Between 1997 and 1999, the Route 18/Route 3 intersection was the site of 232 crashes, of which 136 involved property damage and 96 involved bodily injury. It ranked #23 on the list of the state's high-crash intersections. The Route 18/Pond Street intersection was the site of 93 crashes, of which 50 involved property damage and 43 involved bodily injury. It ranked #140* on the list of the state's high-crash intersections. The Route18/Middle Street intersection was the site of 101 crashes, of which 68 involved property damage and 33 involved bodily injury. It ranked #180* on the list of the state's high-crash intersections. The Route18/Park Avenue intersection was the site of 97 crashes, of which 66 involved property damage and 31 involved bodily injury. It ranked #199* on the list of the state's high-crash intersections.

Mobility
According to MassHighway traffic counts, the average daily traffic on Route 18 along this stretch of roadway is as follows:

Weymouth:
- North of Park Avenue (2000 counts) – 31,200 vehicles
- North of Trotter Road (1999 counts) – 25,200 vehicles
- North of Pond Street (2000 counts) – 25,300 vehicles

Abington:
- North of Route 139 (1999 counts) – 19,400 vehicles

Intersection analyses were performed as part of the South Weymouth Access Study in August 2000. The existing levels of service (LOS) during the PM peak period were as follows:

Weymouth:
- Route 18/West Street – LOS E
- Route 18/Park Avenue – LOS C
- Route 18/Columbian Street – LOS E
- Route 18/Pleasant Street – LOS D
- Route 18/Trotter Road – LOS D

Abington:
- Route 18/Route 139 – LOS D

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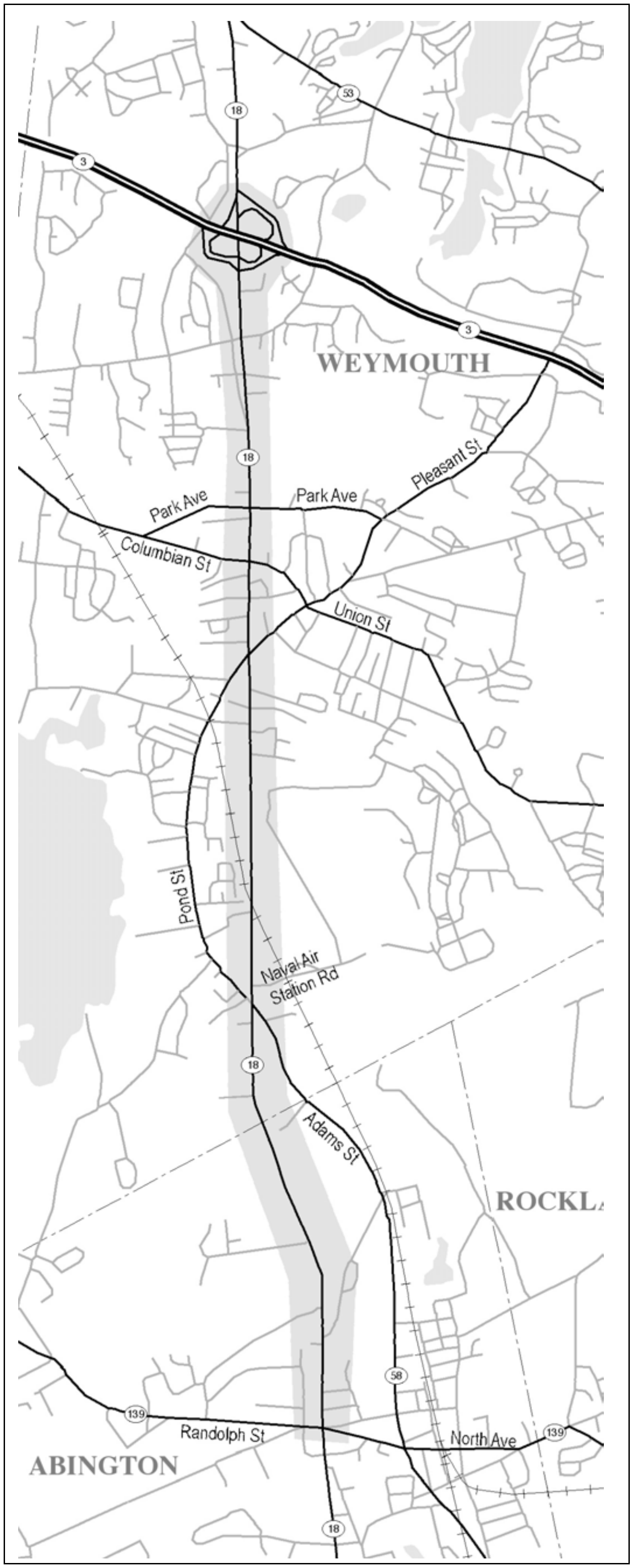
* The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.



WEYMOUTH
ROCKL
ABINGTON
Park Ave
Park Ave
Pleasant St
Columbian St
Union St
Pond St
Naval Air Station Rd
Adams St
Randolph St
North Ave
18
3
53
58
139

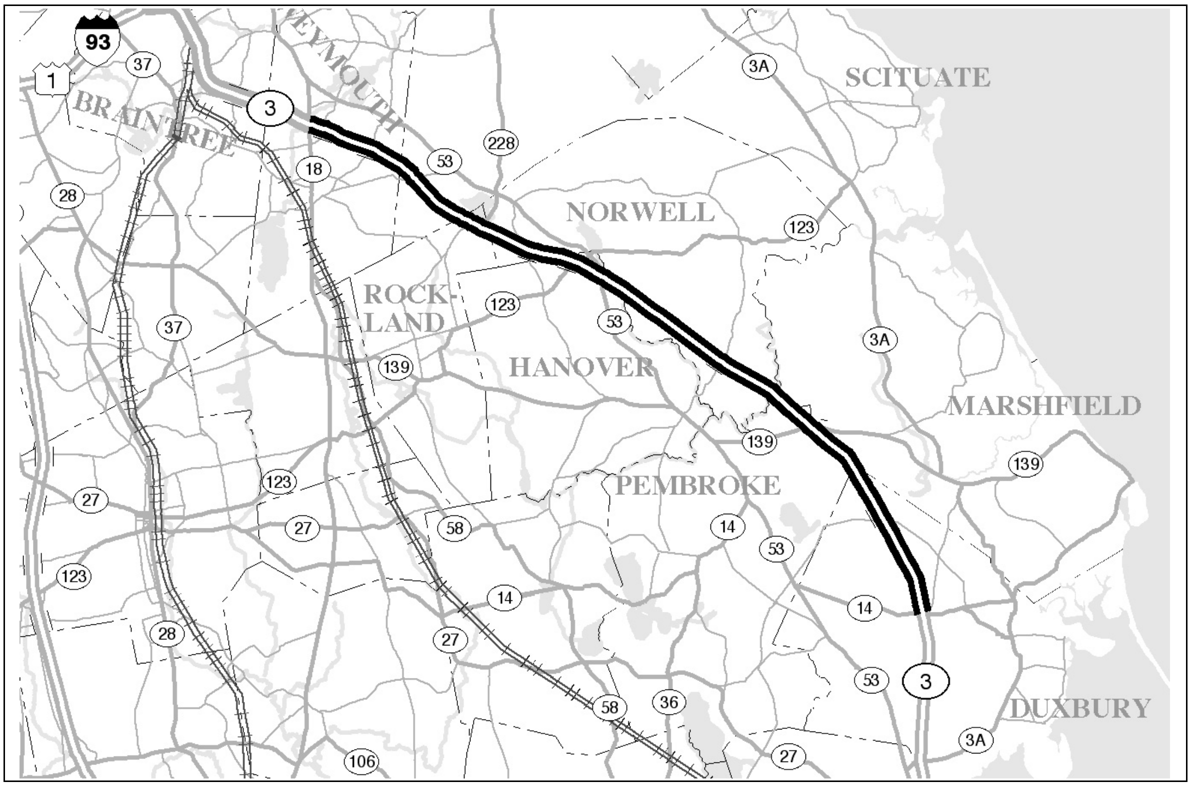
According to 2002 Congestion Management System monitoring performed by CTPS, the average AM and PM speed on Route 18 in the northbound and southbound directions is calculated to be less than 15 mph for three segments of the roadway in the project area. The average travel speed on Route 18 is below 70% of posted speed along 25 segments in the northbound and southbound directions in the AM and PM peak periods. Six signalized intersections in the project area are ranked in the top 25 most delayed intersections (monitored through the CMS roadway network) for the South Shore Coalition MAPC subregion in the PM peak period.

Connectivity
Route 18 provides access to the South Weymouth commuter rail station on the Plymouth Line. The South Shore Tri-Town Development Corporation, responsible for redevelopment of the South Weymouth Naval Air Station, is proposing an expanded, multi-modal station in conjunction with the existing South Weymouth commuter rail station.

Economic Opportunities
This project is a component of the development plan for the former South Weymouth Naval Air Station, which involves the redevelopment of the 1,450-acre site, consistent with the Re-Use Plan formula. The South Shore Tri-Town Development Corporation foresees corporate office park, entertainment, and recreation uses, with more than 60% of the site open space (recreational and conservation).

WEYMOUTH TO DUXBURY: ROUTE 3 SOUTH ADDITIONAL LANES ($180,000,000)

Widen Route 3 from two lanes in each direction to three lanes in each direction from Weymouth (Exit 16 at Route 18) to Duxbury (Exit 11 at Route 14). It will restore the shoulder breakdown lanes, provide safety recovery zones, and upgrade interchange acceleration and deceleration lanes. The project also involves design configuration improvements to the interchange ramps at Exit 12 (Route 139 in Pembroke), related intersection improvements at highway ramps at Exits 11, 12, 13, and 15, and upgrading and expanding the park-and-ride lots at Exits 12 and 14.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

More than 65% of the total land area in the Route 3 corridor communities is categorized as already developed, public open space, or land within water bodies; 34% is categorized as "remaining developable" land.

There is substantial existing commercial, office, and industrial development along the highway, particularly at the interchanges and where proximity to the highway provides visibility. Much of the land near the interchanges is zoned for these non-residential uses. There are wetlands in some areas along the roadway

and also some residential development. Retail commercial uses are in place near all but the Exit 11 interchange in Duxbury, where wetland and open water exist. In addition, Exit 14 in Rockland has substantial industrial and office space in nearby industrial office parks and areas. Exit 15 has a nearby industrial park. Land use in Weymouth north of Exit 15 is both residential (including apartment and condominium complexes) and industrial.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- Adding a lane in each direction may reduce congestion and improve safety, but it will also improve access to parcels near existing interchanges and promote additional highway business and retail uses along this corridor. This will use up some of the additional capacity, and perhaps draw development away from locations near the parallel commuter rail routes.
- A better estimate of the land use impacts of this project should be completed before there is a commitment to begin design.

Safety

Between 1997 and 1999, this project area included four interchanges that were classified as high-crash locations—Route 3/Derby Street, Route 3/Route 139, Route 3/Route 228, and Route 3/Route 18.

- Route 3/Derby Street intersection (Hingham) was the site of 83 crashes, of which 41 involved property damage and 42 involved bodily injury. It ranked #156*on the list of the state's high-crash intersections.
- Route 3/Route 139 intersection (Pembroke) was the site of 68 crashes, of which 38 involved property damage and 30 involved bodily injury. It ranked #282* on the list of the state's high-crash intersections.
- Route 3/Route 228 (Rockland) intersection was the site of 90 crashes, of which 54 involved property damage and 36 involved bodily injury. It ranked #179*on the list of the state's high-crash intersections.
- Route 3/Route 18 (Weymouth) intersection was the site of 232 crashes, of which 136 involved property damage and 96 involved bodily injury. It ranked #23 on the list of the state's high-crash intersections.

* The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

Mobility

According to MassHighway traffic counts, the average daily traffic on Route 3 along this stretch of roadway is as follows:

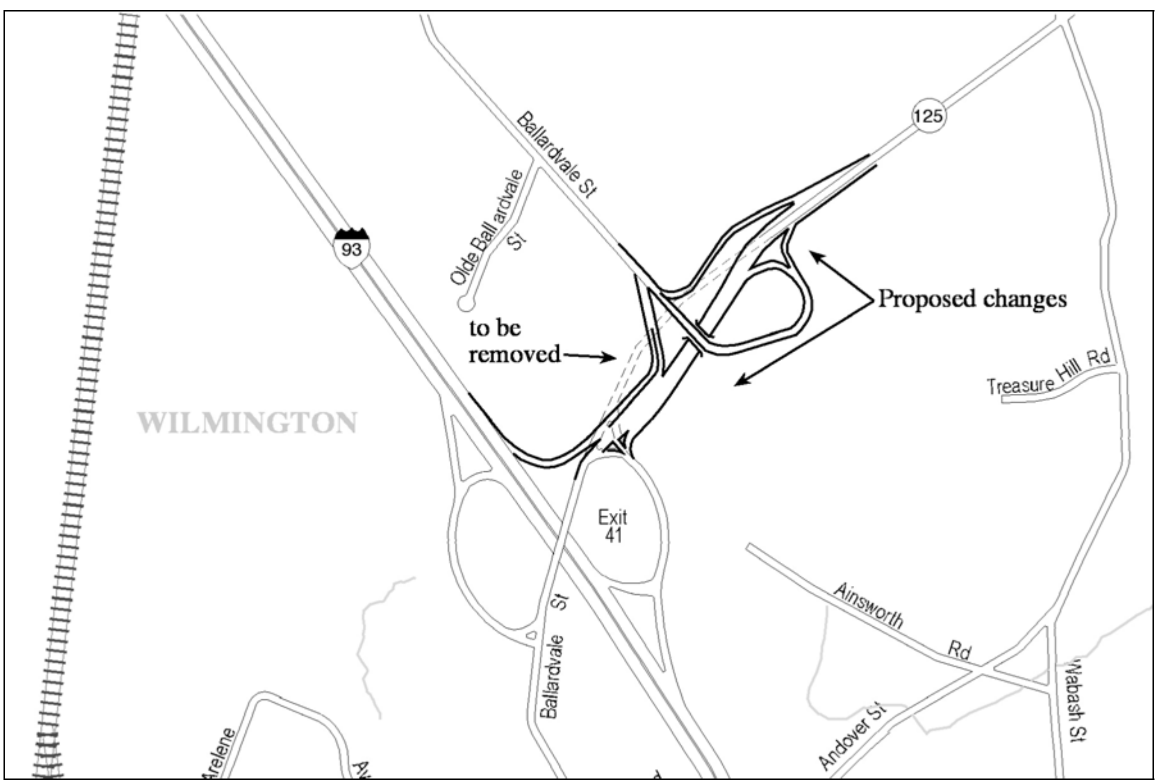
- Weymouth:
  - North of Route 18 Exit 16 (2001 counts) – 137,200 vehicles
  - South of Route 18 Exit 16 (1999 counts) – 104,700 vehicles
- Hingham:
  - North of Derby Street Exit 15 (1998 counts) – 97,900 vehicles
  - Between Exits 14 and 15 (2001 counts) – 83,900 vehicles
- Norwell:
  - Between Exits 13 and 14 (2001 counts) – 76,000 vehicles
  - South of Exit 13 (2001 counts) – 60,300 vehicles
- Pembroke:
  - At the Marshfield Town Line (2001 counts) – 71,300 vehicles
- Duxbury:
  - North of Exit 11 (2001 counts) – 53,900 vehicles

According to traffic analysis performed as part of the supplemental draft environmental impact report, existing levels of service are E or F over much of the project area in both the AM and PM peak hours. Congestion has increased to the point that the State Police, MassHighway, and the Federal Highway Administration agreed to allow the use of the breakdown lane as a travel lane during peak periods.

WILMINGTON: INTERSTATE 93/ROUTE 125/BALLARDVALLE STREET INTERCHANGE ($15,000,000)

Reconstruct the Interstate 93/Route 125/Ballardvalle Street interchange to improve all connecting movements. A second left-turn lane on the I-93 southbound ramp at Route 125 will be constructed for vehicles traveling eastbound on Route 125. A signal will also be installed. The existing bridge over I-93 will be striped for three lanes—two westbound and one eastbound. Traffic exiting Ballardvalle Street to I-93 northbound will do so by way of a new ramp that begins at Ballardvalle Street and provides free flow onto I-93 northbound. Traffic exiting Ballardvalle Street for Route 125 westbound or I-93 southbound will do so by way of a connection to Route 125 westbound that parallels the free-flow ramp. Traffic will then proceed over the I-93 bridge in the two westbound lanes.

In addition, Route 125 east of I-93 will be relocated to the south of its existing location with two travel lanes in each direction as well as two travel lanes entering Ballardvalle Street by way of a new ramp. The ramp provides a grade separation (overpass) of Route 125, allowing for free-flow movement of traffic. This ramp will allow traffic to enter Ballardvalle Street from Route 125 eastbound and exit Ballardvalle to Route 125 eastbound. Traffic entering Ballardvalle from the west will do so by way of a new ramp.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use
The land north and west of the interchange area is zoned for industrial use. Most of the existing industrial development is light manufacturing, research and development, or warehousing. The land south and west of the interchange is zoned for residential use. According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the residential land just east of the interchange is classified as future developable residential land. All other land around the interchange is subject to partial development constraints.

Safety
This project is at a high-crash location—between 1997 and 1999, the interchange has been the site of 92 crashes, of which 63 involved only property damage, 28 involved bodily injury, and one resulted in a fatality. As such, it ranked #218[9] in the list of the state's high-crash intersections. As described above, the design of this project will maintain all current movements in the area, while adding additional free-flow movements to I-93 northbound. It will also provide free-flow movements at the Ballardvalle Street intersection with Route 125.

Mobility
There are currently traffic congestion problems at the interchange, including failure levels of traffic operations during the AM and PM peak commuting hours. The environmental assessment final environmental impact report dated July 2000 indicates that all left-turn movements at the three intersections (125/I-93 southbound, 125/I-93 northbound, and 125/Ballardvalle) are operating at LOS F in both the AM and PM peak periods. Average daily traffic on Route 125 between I-93 and Ballardvalle Street is approximately 27,000 vehicles.

Note

This project will result in impacts on federal- and state-defined wetlands and will require a wetlands variance to allow for alteration of bordering vegetated wetlands. The project will include a redesigned drainage system, along with a wetland replication area, which is expected to increase the level of protection for the area's water resources. In addition, the project will require the taking of 11.6 acres of private property.

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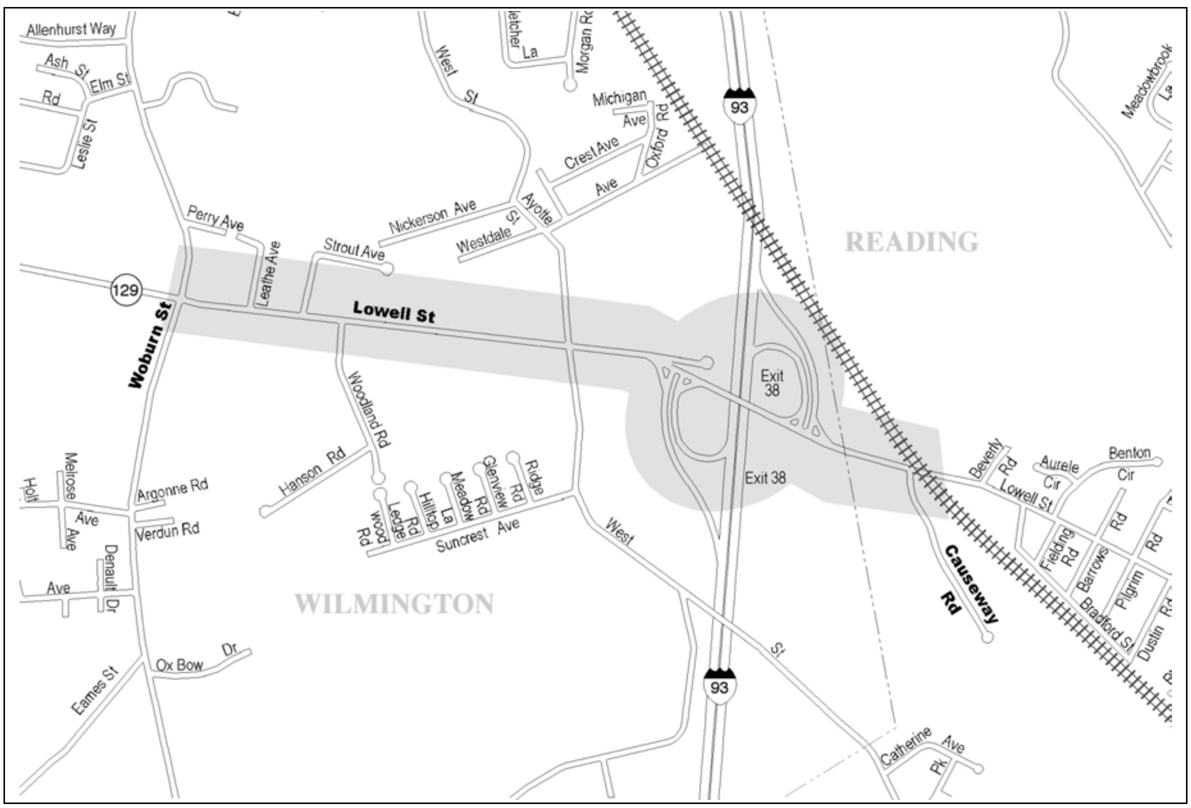
[9] The MPO safety ranking of this intersection is different than the official MassHighway ranking due to a different numbering system.

WILMINGTON AND READING: INTERSTATE 93/ROUTE 129 INTERCHANGE IMPROVEMENT PROJECT ($15,000,000)

Reconstruct the Interstate 93/Route 129 (Lowell Street) interchange by:

- Constructing elevated slip ramps connecting I-93 northbound and southbound to Route 129 eastbound and westbound
- Widening the existing Route 129 bridge over I-93
- Widening the existing Route 129 bridge over the Boston-Maine Railroad
- Relocating of the intersection of Route 129 and West Street and realigning the intersection of Woburn Street and Route 129
- Upgrading the signals at the intersections of Route 129/West Street and Route 129/Woburn Street

Route 129 will also be widened from two lanes to four lanes from the I-93 interchange to Woburn Street, a distance of approximately one mile.



Project's Context/Possible Impacts, by MPO Policy Area

Land Use

The project area adjacent to the interchange in the northwest quadrant in Wilmington is zoned for business use, while the land to the south is zoned for general industry. All other land within the project area is zoned for residential use. The land in Reading within the project area is zoned for residential use.

According to the Executive Office of Environmental Affairs/Metropolitan Area Planning Council buildout analysis, the land in Wilmington in the vicinity of the interchange is subject to partial development constraints, while the other land in the project area is subject to absolute development constraints. There is future developable land in the Reading portion of the project area.

Safety

This project area includes two high-crash locations. Between 1997 and 1999, the I-93/Route 129 interchange was the site of 115 crashes, of which 75 involved property damage and 40 involved bodily injury. It ranked #127[*] on the list of the state's high-crash intersections. The Route 129/Woburn Street intersection was the site of 48 crashes, of which 31 involved property damage and 17 involved bodily injury. It ranked #257[*] on the list of the state's high-crash intersections.

Mobility

According to MassHighway traffic counts performed in 1997 on Route 129 west of I-93, the average daily traffic (ADT) was 26,400 vehicles, while the ADT on Route 129 east of Interstate 93 was 15,700 vehicles. The Functional Design Report indicates that the existing levels of service (LOS) at the intersections in the study area are as follows:

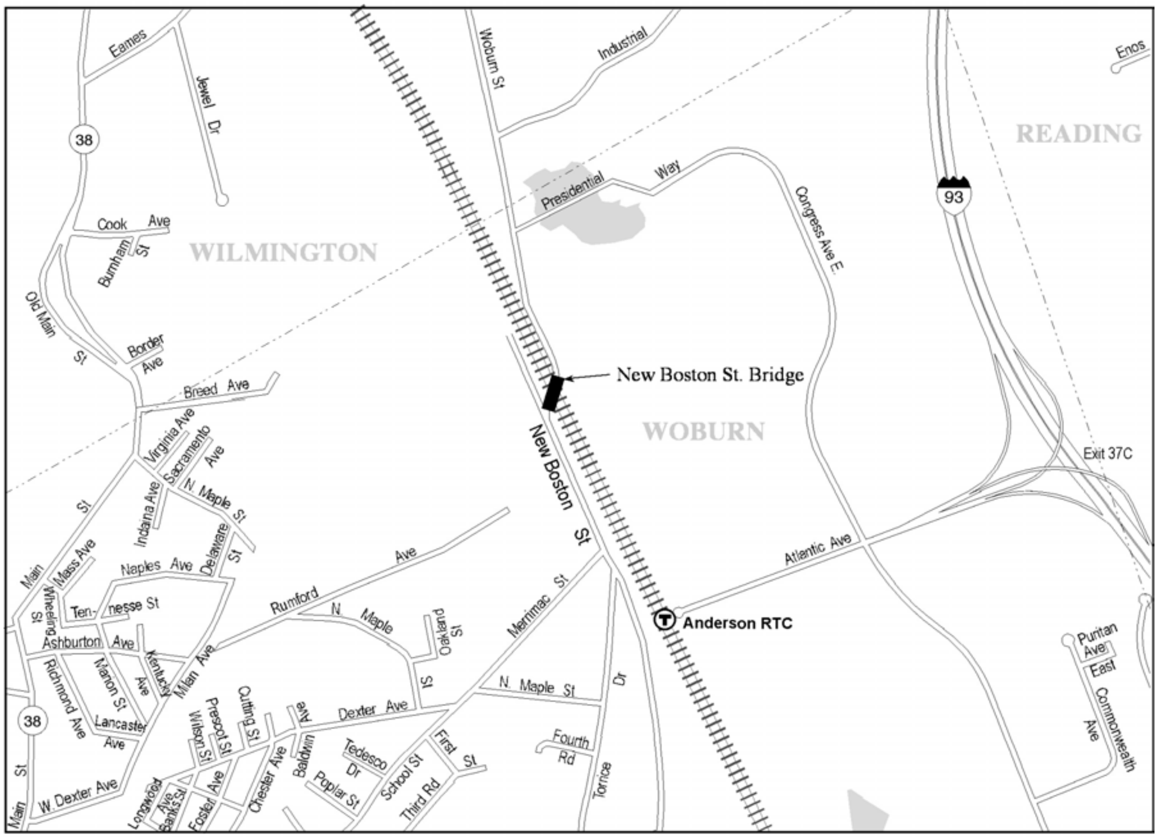
> I-93 NB Ramps/Route 129 – LOS C (AM peak hour)/LOS B (PM peak hour)
> I-93 SB Ramps/Route 129 – LOS B (AM peak hour)/LOS D (PM peak hour)
> Route 129/West Street – LOS C (AM peak hour)/LOS C (PM peak hour)
> Route 129/Woburn Street – LOS F (AM peak hour)/LOS E (PM peak hour)

According to 2001 Congestion Management System (CMS) travel monitoring performed by CTPS, the average delay on Route 129 in the project area is greater than one minute in the eastbound and westbound direction in the AM and PM peak periods. In addition, the Woburn Street/Route 129 intersection is tentatively ranked the fifteenth most delayed intersection (monitored through the CMS program) for the North Suburban Planning Council subregion in the PM peak period.

[*] The MPO safety ranking of this intersection is different from the official MassHighway ranking due to a different numbering system.

WOBURN: NEW BOSTON STREET BRIDGE ($2,000,000)

Construct a bridge on New Boston Street at the northern end of Woburn Industrial Park where New Boston Street crosses the MBTA Lowell Branch commuter rail line to Woburn Street in Wilmington. This connection existed until approximately 30 years ago, when the bridge was destroyed by fire; it was never reconstructed.



Project’s Context/Possible Impacts, by MPO Policy Area

Land Use

The majority of the land in the New Boston Street area in Woburn is zoned for industrial use, and existing development in the area is primarily commercial/industrial. With the recent opening of the Anderson Regional Transportation Center (RTC) and the I-93 Industriplex interchange, the City of Woburn anticipates additional office and retail development in the project area over the next few years. Just north of the proposed project, in Wilmington, the land is zoned as industrial and includes Southeast Wilmington Industrial Park. Further north on Woburn Street in Wilmington and south of Route 129, the land is zoned as residential. According to the Executive Office of Environmental

Affairs/Metropolitan Area Planning Council buildout analysis, this project is located in an industrial park redevelopment area.

The Metropolitan Area Planning Council, the regional planning agency for the MPO region, provided the following comments/analysis:

- The industrial area adjacent to the project is a superfund site.
- This area of Woburn is state-designated as an economically distressed area/economic target area.
- Zoning and undeveloped nearby parcels suggest that significant new development could take place in the area, with access provided by the new I-93 interchange and the Anderson RTC transit hub. Rebuilding the bridge is not likely to add to these development incentives, but will provide another means of spreading the trips over more roadways for trips to adjacent sites.
- Wilmington's concerns about the project are based on an anticipated increase in trips that would use Woburn Street in Wilmington to access the area.

Mobility
No traffic studies have been performed to date; however, the opening of this bridge would provide a second means of access to the growing Industriplex area for residents of Wilmington and communities to the north, as well as for emergency vehicles from the North Woburn Fire Station.

Connectivity
The Anderson Regional Transportation Center is located just south of the proposed New Boston Street Bridge. The new bridge would provide an additional automobile access point to the park-and-ride and transit services offered at this center.

Transit Projects in the Recommended Plan

Table 5-4 lists the transit projects funded under the 30% capacity program, their costs, and when they are projected for construction. It includes five projects (Arborway Restoration, Red Line/Blue Line Connector, Russia Wharf Ferry, Medford Hillside Green Line, and Fairmount Line Improvements) that will be built assuming funding provided by the General Court and one project that the MPO assumes will be built with private funding (Assembly Square Orange Line Station). Midpoint construction costs are used, based on a recommendation from the Federal Transit Administration to be consistent with the procedure for New Starts Applications. Finances for this Plan are based on the MBTA's submitted New Starts application for the Silver Line Phase 3 project.

A brief description of each project and a short statement of the benefits of each are provided below. The descriptions are taken from the MBTA's *Program for Mass Transportation*. The location of each of these transit projects is shown in Figure 5-1.

Table 5-4

Regionally Significant Transit Projects in the Recommended Plan

Ongoing No-Build Projects	Current Cost	Mid-Point Cost	2004-2009	2010-2015	2016-2025	Total
Silver Line Phase 2, et al.	$120,000,000	$120,000,000	$120,000,000			$120,000,000
SIP Commitments	2003 PMT Cost	Mid-Point Cost				
Arborway Restoration (Boston)	$71,000,000	$71,000,000	$71,000,000			$71,000,000
Red Line/Blue Line Connector (Boston)	$193,000,000	$237,000,000	$57,000,000	$180,000,000		$237,000,000
Russia Wharf Ferry Terminal (Boston)	$4,000,000	$4,000,000		$4,000,000		$4,000,000
Old Colony/Greenbush Commuter Rail (Boston to Scituate)	$470,000,000	$434,000,000	$434,000,000			$434,000,000
Green Line to West Medford (Boston, Medford & Somerville)	$375,000,000	$461,000,000	$116,000,000	$345,000,000		$461,000,000
Sub-Total	$1,113,000,000	$1,207,000,000				$0
Other Transit Projects	2003 PMT Cost	Mid-Point Cost				
Fairmount Line Improvements (Boston)	$35,000,000	$35,000,000	$35,000,000			$35,000,000
Silver Line Phase 3 (50/50) (Boston)	$952,000,000	$759,000,000	$326,000,000	$433,000,000		$759,000,000
Urban Ring Phases I & 2 (Compact Communities)	$566,000,000	$982,000,000		$126,000,000	$856,000,000	$982,000,000
100 Additional Buses to Improve Service on Existing Routes	$34,000,000	$41,000,000		$41,000,000		$41,000,000
Assembly Square Orange Line Station (Somerville)	$29,000,000	$29,000,000		$29,000,000		$29,000,000
North Shore Transit Improvements (Revere to Salem Corridor)	$358,000,000	$621,000,000			$621,000,000	$621,000,000
Sub-Total	$1,974,000,000	$2,467,000,000				$0
Total Cost of Proposed Transit Projects:	$3,207,000,000	$3,794,000,000	$1,159,000,000	$1,158,000,000	$1,477,000,000	$3,794,000,000
RTP Transit Capacity Target:	$2,839,000,000	$2,839,000,000	$880,000,000	$600,000,000	$1,303,000,000	$2,783,000,000
Assumed State Funding from Legislative Action:			$279,000,000	$529,000,000	$0	$808,000,000
Assumed New Start Funding beyond Silver Line 3:			$0	$0	$240,000,000	$240,000,000
Assumed TIFIA Funding			$0	$29,000,000	$0	$29,000,000
Adjusted Transit Capacity Target:			$1,159,000,000	$1,158,000,000	$1,543,000,000	$3,860,000,000
Surplus/Deficit:	-$368,000,000	-$955,000,000	$0	$0	$66,000,000	$66,000,000

• Legislatively enacted funding is assumed to be outside of the 70/30 split. Such funding covers the cost of the Fairmount Branch Improvements (SB 1876) and all legal commitments except Greenbush, which will be funded with MBTA revenues consistent with current plans.

• Assumed New Starts funding has been adjusted for the 70/30 split ($491 million in New Starts for Urban Ring converts to $147 million in additional capacity and $310.5 million for North Shore Transit Improvements converts to $93 million).

• Project costs are based upon the PMT. Three adjustments have been made to the base costs--one-half of the cost of the Fairmount project are assumed to be funded under the 70% maintenance and improvement program, they are for infrastructure improvements that are needed regardless of the expansion project; the cost the Greenbush project have been adjusted to reflect the official contract estimate; and Silver Line III was adjusted to reflect a revised design.

• Project costs have been adjusted to mid-point construction (inflated 3.5% per year to median construction year).

• The MBTA and the City of Somerville are pursuing private funding for the Assembly Square Orange Line Station, including the possible use of Transportation Infrastructure Finance and Innovation Act (TIFIA) funds. The use of TIFIA funding for this project would probably necessitate the development of the Assembly Square area as a large, unified project with the new transit station as

D RESTORE GREEN LINE SERVICE BETWEEN HEATH ST AND ARBORWAY

Description

This project would restore service on the Green Line E-branch between Heath Street and Arborway, a distance of 1.9 miles. Rail service in this segment was last operated in 1985 with PCC streetcars. The infrastructure would need to be replaced and upgraded to allow for operation of modern light-rail equipment.

Restoration would include replacement of track, replacement of catenary and power systems, installation of accessible station platforms at intermediate stops, and construction of a storage yard at Arborway. This project is a SIP and ACO legal commitment (see table 2-2).

Capital Features

Reconstruction of 1.9 miles of street-running light rail trackage, construction of intermediate stations, and purchase of additional vehicles.

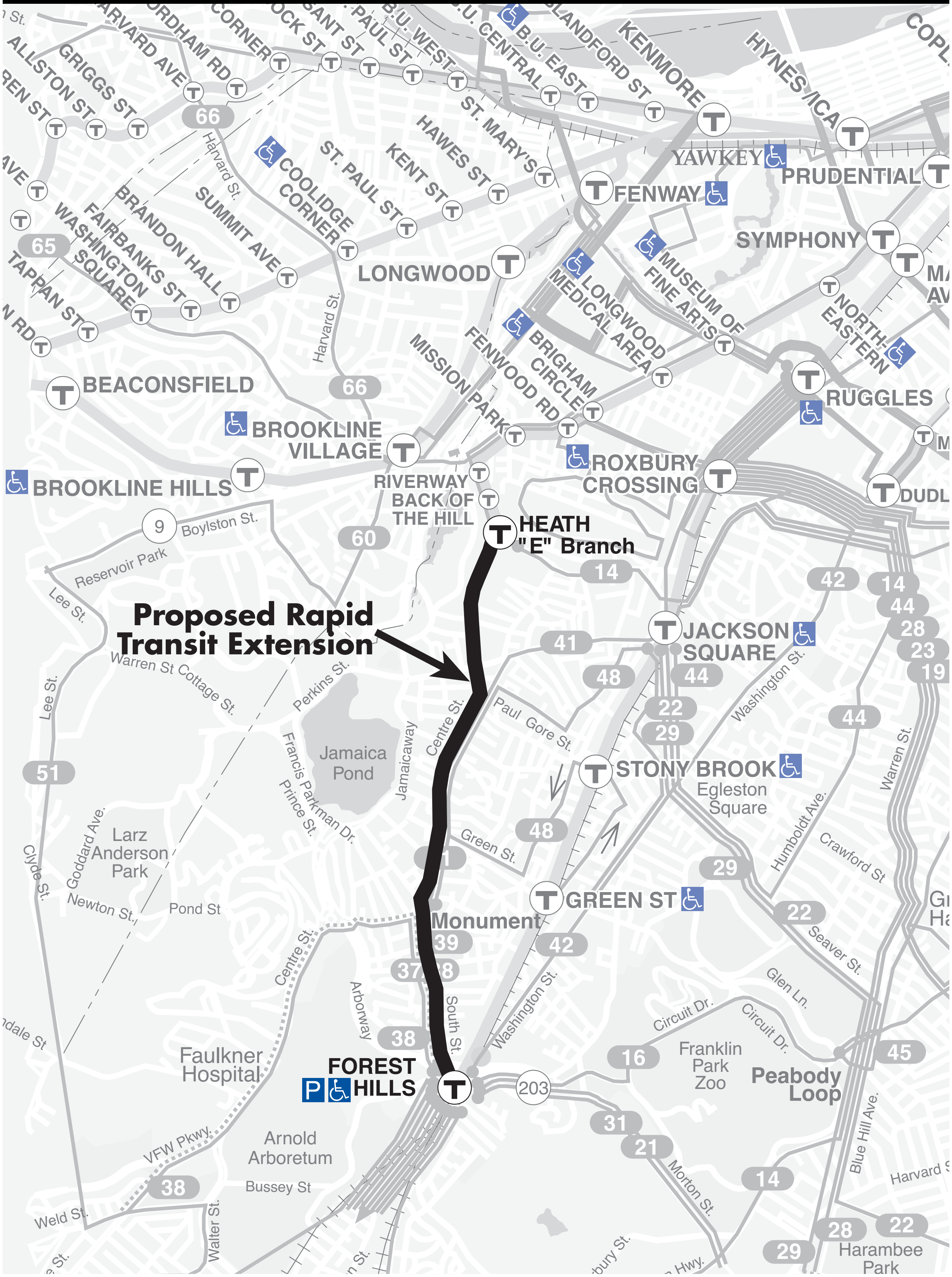
Capital Cost	**$71.9 million (Based on 2001 MBTA Planning Study)**
Operating Cost	**No added cost, would replace Route 39**
Daily Ridership Increase on Mode	**14,200**
Net Increase in Daily Transit Ridership	**200**
Capital Cost/New Transit Rider	**$359,400**
Operating Cost per Wkday/New Transit Rider	**No added cost**
Capital Cost/Travel Time Benefit	**$11,115,800**
Operating Cost/Travel Time Benefit	**No added cost**
Travel Time Savings	**6 hours per weekday**

Assessment

This is a medium priority rapid transit expansion project. The capital cost for this project is $71.9 million. Because this project would replace Route 39 bus service, there would be no anticipated increase in total system operating costs. Green Line service between Heath Street and Arborway was replaced with Route 39 bus service in December 1985. Restoration of Arborway service is a project required as part of Central Artery mitigation agreements. The existing E-Heath Street Green Line branch would be extended back to Arborway (Forest Hills) and Route 39 bus service discontinued. Green Line ridership would expand by 14,200 compared to the existing Heath Street service. Of this total, 200 passengers per day would be new transit riders, the majority would be former patrons of Route 39 bus service. The capital cost per new transit rider would be very high at $359,400. There would be no increase in operating costs per new passenger however, as this project would replace bus Route 39.

Impacts on air quality would be low, as few new riders would be diverted from automobiles to this service. Part of the line would serve environmental justice communities. Restoration of service would provide one-seat rides between Jamaica Plain and Park Street, with improved transfers to the remainder of the rapid transit system. Frequency of service available in the entire corridor between Forest Hills and Copley, however, would be reduced, as the present overlap of service in the Heath Street-Copley segment between bus Route 39 and E-Heath Street Green Line service would be eliminated.

RESTORE GREEN LINE SERVICE BETWEEN HEATH ST AND ARBORWAY



D BLUE–RED CONNECTOR

Description

This project would extend the Blue Line from Bowdoin Station in Boston to the Charles/MGH Red Line Station via a new subway, allowing a direct transfer between these lines. The Blue-Red Connector is a SIP, CA/T, and ACO legal commitment (see table 2-2).

Capital Features

This would be a 0.4-mile extension, entirely in a new subway, including the addition of a new level to the Charles/MGH Station. (Bowdoin Station is scheduled to be closed in conjunction with implementation of six-car train service on the Blue Line.)

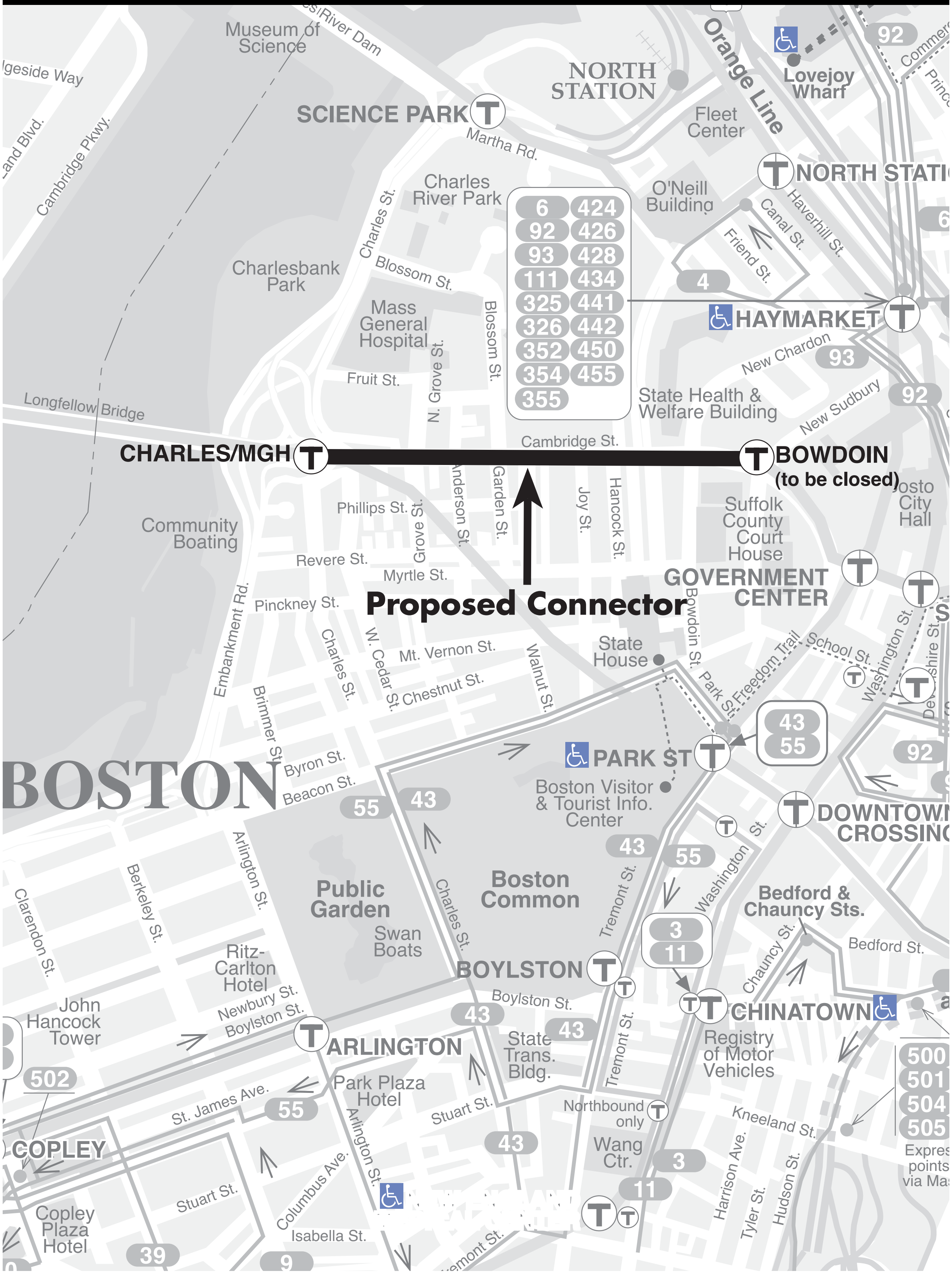
Capital Cost	**$174.6 million (Based on 2000–2025 RTP update)**
Operating Cost	**$7,200 per weekday**
Daily Ridership Increase on Mode	**6,500**
Net Increase in Daily Transit Ridership	**2,800**
Capital Cost per New Transit Rider	**$63,500**
Operating Cost per Wkday/New Transit Rider	**$2.60**
Capital Cost/Travel Time Benefit	**$107,500 per hour**
Operating Cost/Travel Time Benefit	**$4.50 per hour**
Travel Time Savings	**1,625 hours per weekday**

Assessment

Overall, this project is rated medium priority. Capital cost would be in the mid-range among rapid transit extension projects analyzed. It would be among the more cost-effective projects in terms of capital cost relative to new transit rider and to air quality improvements. Operating cost per new passenger would be among the lowest of any project. The connector would permit direct transfers between the Blue Line and the Red Line for the first time. It would be used mostly by passengers traveling between Red Line stations from Alewife to Charles/MGH inclusive and Blue Line Stations from State to Wonderland (or beyond if the Blue Line is extended in that direction). It is rated high in economic and land-use development impacts. It would be located in a state-designated revitalization area, where local plans call for mixed-use development. The MBTA will soon begin work on an analysis of the Blue-Red Connector that will provide greater detail on this project.

Source: Program for Mass Transportation

BLUE–RED CONNECTOR



FERRY EXPANSION–RUSSIA WHARF/SOUTH STATION

Description

This project would implement a new ferry route in Boston Inner Harbor, from the existing terminal at the Charlestown Navy Yard to a new terminal at Russia Wharf, in Fort Point Channel at Congress Street. The construction of Russia Wharf is a CA/T legal commitment (see table 2-2).

Capital Features

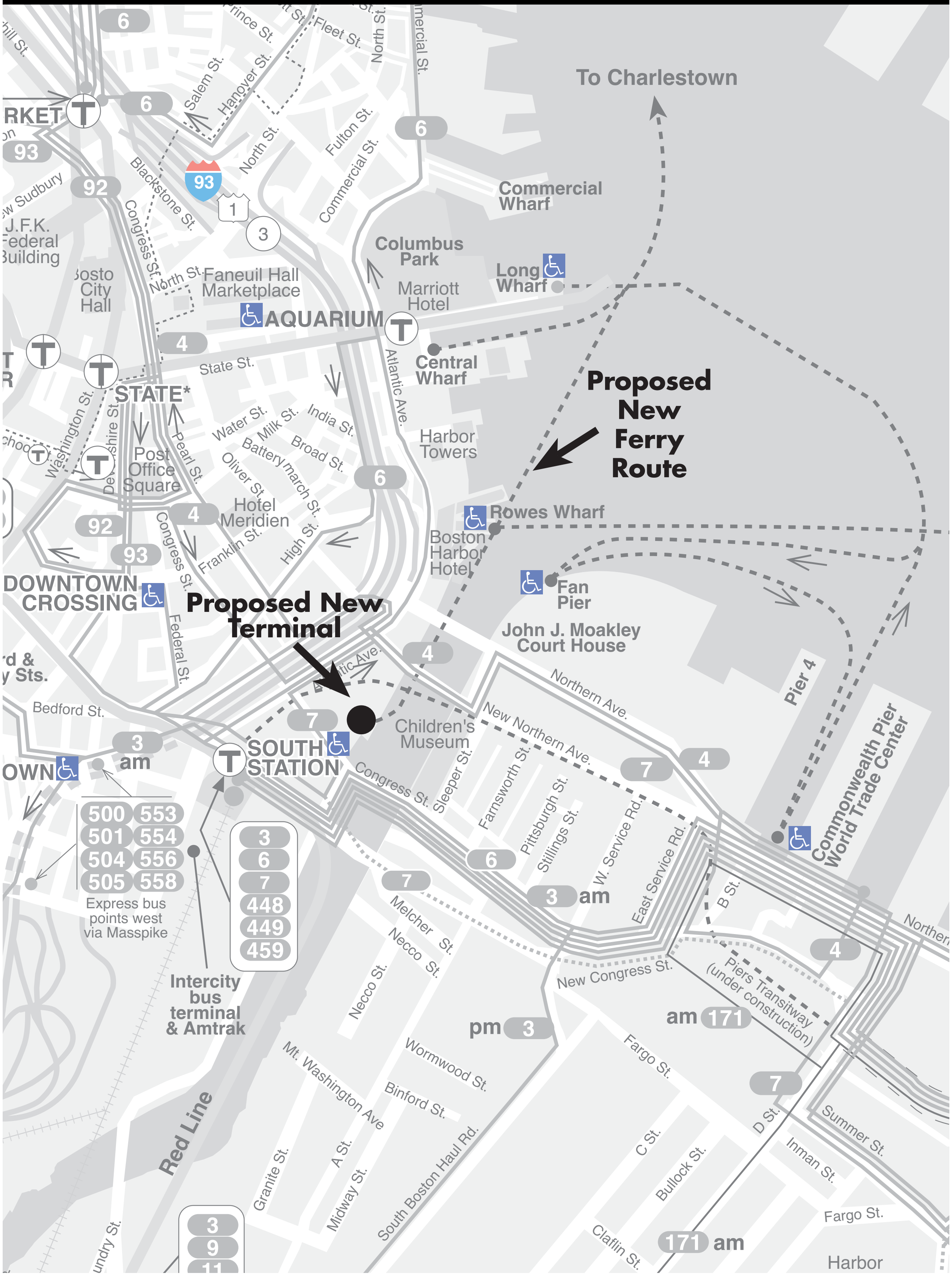
This route would require acquisition of two medium-size low-speed commuter ferries, and construction of a new terminal at Russia Wharf.

Capital Cost	**$4.0 million (CTPS estimate)**
Operating Cost	**$3,400 per day**
Daily Ridership Increase on Mode	**1,000**
Net Increase in Daily Transit Ridership	**50**
Capital Cost per New transit Rider	**$80,000**
Operating Cost per Wkday/New transit Rider	**$67.10**
Capital Cost/Travel Time Benefit	**$467,800 per hour**
Operating Cost/Travel Time Benefit	**$397.70 per hour**
Travel Time Savings	**9 hours per weekday**

Assessment

This project would provide more convenient connections from homes in the former Charlestown Navy Yard complex to work locations in much of the Financial/Retail and Waterfront districts than is currently provided by existing transit alternatives. It would attract few riders that would not otherwise use some form of transit. The capital and operating costs per new transit rider would be the second-lowest among water transportation projects examined for the PMT. The route would not provide direct service to any environmental justice target communities, but the Russia Wharf terminal would serve a state-designated revitalization area. The overall rating of this project is high priority.

FERRY EXPANSION–RUSSIA WHARF/SOUTH STATION



COMMUTER RAIL BRANCH FROM EXISTING OLD COLONY LINES TO GREENBUSH

Description

This project would restore commuter rail service on a third branch of the Old Colony lines, diverging from the route of the Middleborough/Lakeville and Plymouth/Kingston lines in Braintree and following a combination of active and inactive rail freight routes to the Greenbush section of Scituate. Rail passenger service on this branch was last operated in 1959. This project is a SIP, CA/T, and ACO legal commitment (see table 2-2).

Capital Features

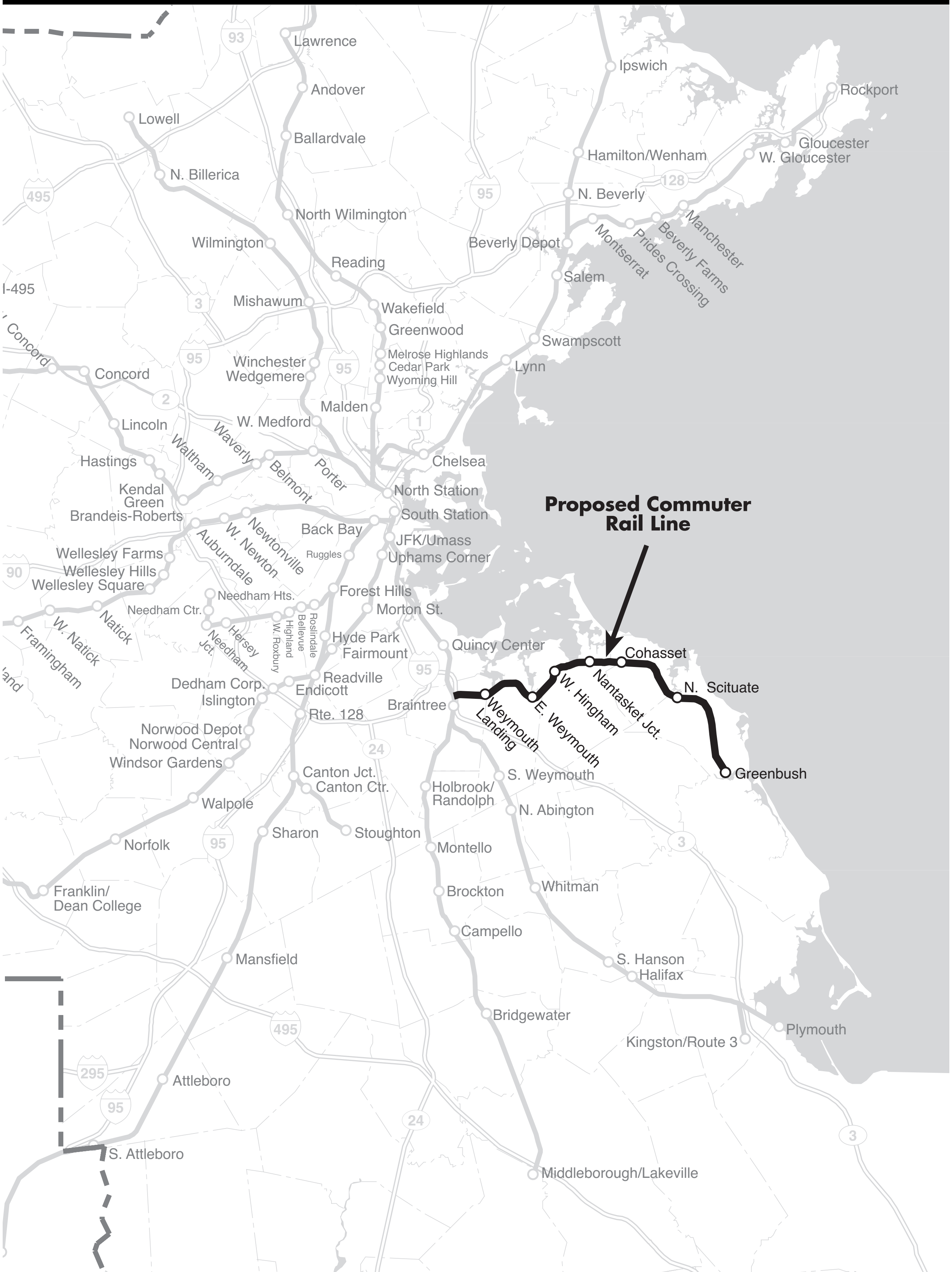
Commuter rail service would be extended over 18 route-miles, of which about one mile is currently used for freight service. Extensive reconstruction on the inactive segment and upgrading of track on the active segment would be required. Several grade crossings at Hingham Center would be eliminated by placing the rail line in a tunnel. A major grade-separation project at Weymouth landing is also anticipated. There would be seven new stations on the line, in Weymouth, Hingham, Cohasset, and Scituate. The Greenbush terminal would be a short distance from the border of Marshfield.

Capital Cost	**$470.0 million**
Operating Cost	**$34,000 per day**
Daily Ridership Increase on Mode	**11,400**
Net Increase in Daily Transit Ridership	**4,600**
Capital Cost per New Transit Rider	**$102,000**
Operating Cost per Wkday/New Transit Rider	**$7.40**
Capital Cost/Travel Time Benefit	**$435,500 per hour**
Operating Cost/Travel Time Benefit	**$31.40 per hour**
Travel Time Savings	**1,079 hours per weekday**

Assessment

Overall, this project is rated high priority. It would attract the second-largest number of total riders and the third-largest number of new transit riders of all commuter rail projects examined for the PMT. In absolute terms it would have one of the highest capital costs of all commuter rail projects, but because of the high ridership, the capital cost per new rider would be near the upper end of the mid-range among such projects. The operating cost per new rider would be at the lower end of the mid-range for commuter rail projects. The project would not serve any environmental justice target communities, but three of the seven stations would serve state-designated revitalization areas. It would rank fourth among all commuter rail projects in reductions of CO, CO2, and VOC emissions, but it would result in the sixth-highest increase in NOx emissions of all commuter rail projects. It would produce the fourth-highest travel time savings among such projects.

COMMUTER RAIL BRANCH FROM EXISTING OLD COLONY LINES TO GREENBUSH



D GREEN LINE TO WEST MEDFORD

Description

This project would extend Green Line service from Lechmere Station to West Medford partly via an existing rail freight line and partly beside the Lowell commuter rail line. It would be an alternative to a Blue Line extension to West Medford. A Green Line extension to Medford Hillside is a SIP, CA/T, and ACO legal commitment (see table 2-2).

Capital Features

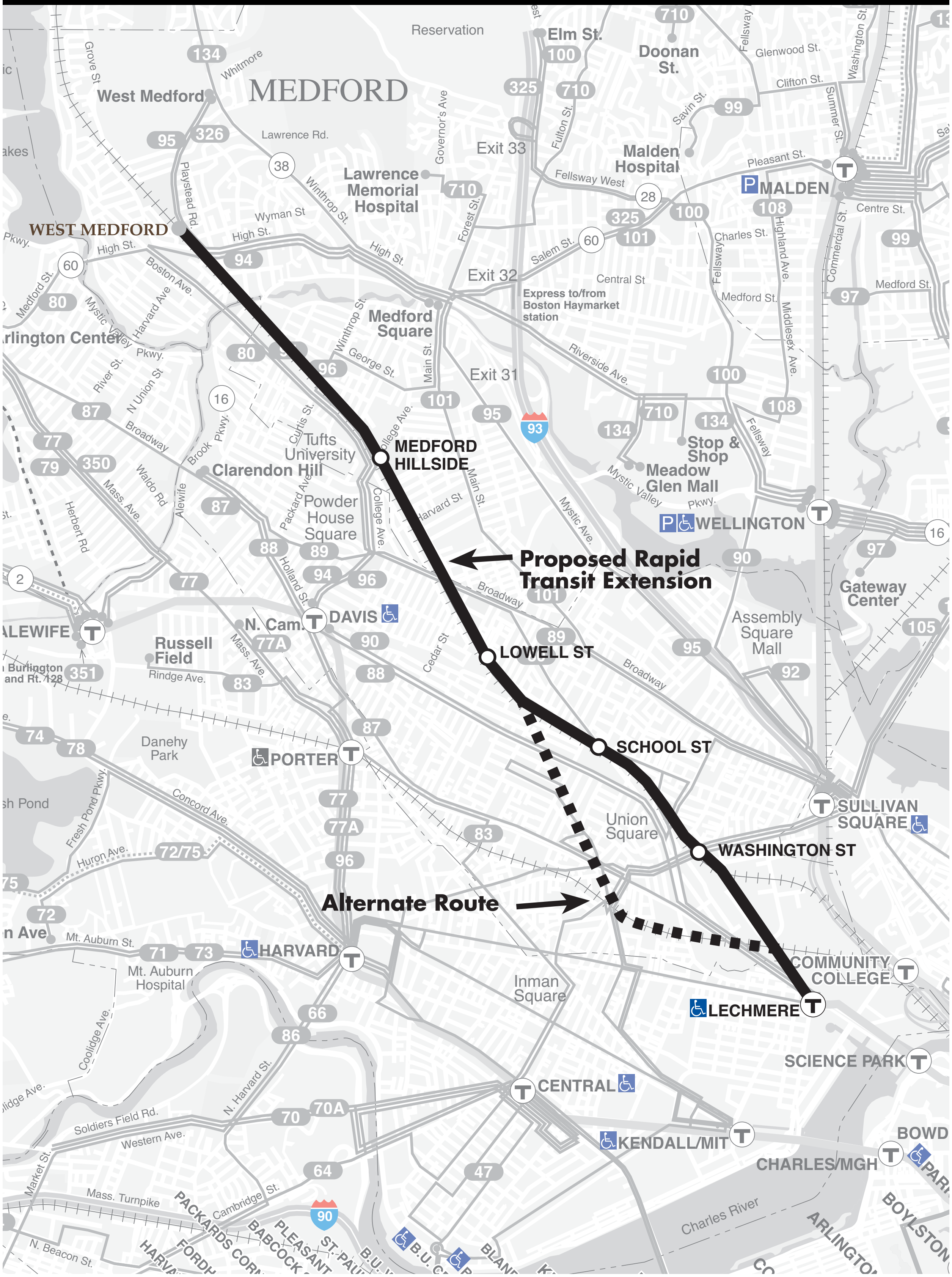
This would be a 4.2-mile extension, including six new stations, in Somerville and Medford and a relocated Lechmere Station. A variation adding about one half mile would run closer to Union Square in Somerville, via a new subway under Prospect Hill. This variation is not reflected in the capital cost estimate.

Capital Cost	**$375.0 million (Based on 2000–2025 RTP update)**
Operating Cost	**$41,700 per weekday**
Daily Ridership Increase on Mode	**8,400**
Net Increase in Daily Transit Ridership	**3,500**
Capital Cost per New Transit Rider	**$105,900**
Operating Cost per Wkday/New Transit Rider	**$11.80**
Capital Cost/Travel Time Benefit	**$227,640 per hour**
Operating Cost/Travel Time Benefit	**$25.30 per hour**
Travel Time Savings	**1,647 hours per weekday**

Assessment

Overall, this project is rated medium priority. It would provide rail transit service to densely developed sections of Somerville and Medford that are currently served by bus routes connecting with the Green, Red, or Orange lines. This would be of greater benefit in terms of convenience than of actual trip time, as it would result in fewer passengers having to transfer from bus to rail to make their trips. Air quality improvements would be only moderate, but the capital cost relative to the air quality benefits would fall in the lower range among rapid transit extensions examined. It is rated medium in economic and land use impacts. The majority of the stations would be located in state-designated revitalization areas where transit-oriented development is planned. This would include a mixture of high-density residential, commercial, and industrial development. The MBTA will soon begin work on an analysis of the extension of Green Line service to West Medford that will provide greater detail on this project.

GREEN LINE TO WEST MEDFORD



FAIRMOUNT LINE IMPROVEMENTS

Description

This project would upgrade service on the Fairmount commuter rail line by adding new stations on the existing route and by increasing the frequency of service.

Capital Features

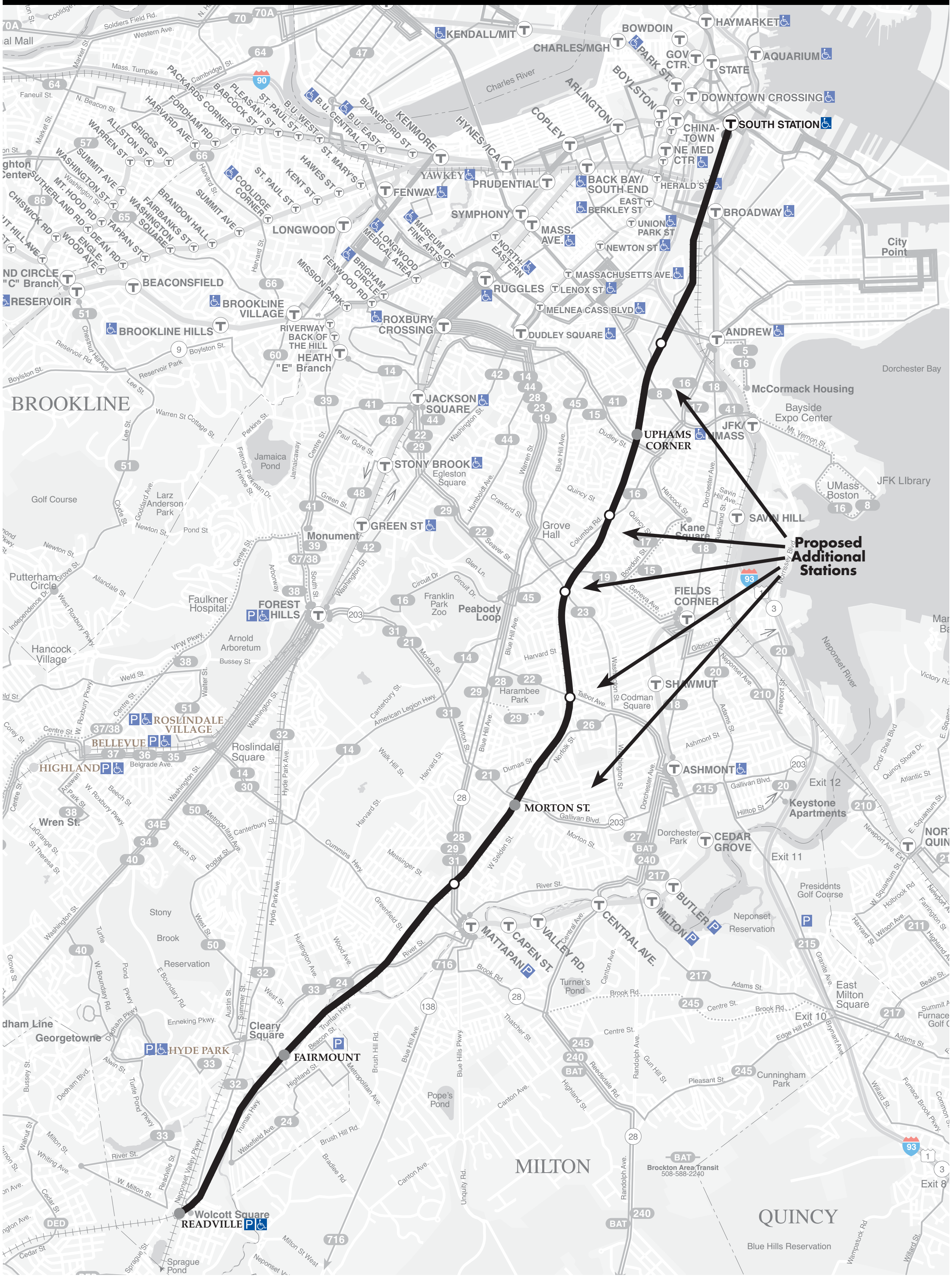
Up to five new stations would be built in Boston neighborhoods, interspersed with existing stations. Approximate locations under consideration include Blue Hill Avenue near Mattapan Square, Talbot Avenue, Washington Street and Columbia Road in Dorchester, and Newmarket Square in Roxbury. Route length would not change. Some additional rolling stock would be needed to increase peak service frequency.

Capital Cost	**$70.0 million (MBTA Planning Dept. estimate)**
Operating Cost	**$2,800 per weekday**
Daily Ridership Increase on Mode	**6,500**
Net Increase in Daily Transit Ridership	**220**
Capital Cost per New Transit Rider	**$318,180**
Operating Cost per Wkday/New Transit Rider	**$12.70**
Capital Cost/Travel Time Benefit	**$158,000 per hour**
Operating Cost/Travel Time Benefit	**$6.30 per hour**
Travel Time Savings	**443 hours per weekday**

Assessment

Overall, this project is rated high priority. It would provide direct rail service to the Financial and Waterfront districts from sections of Dorchester now served by feeder buses to rapid transit lines. The number of riders served would be among the largest of any of the commuter rail expansion projects examined for the PMT, but the majority of them would be diverted from other transit services. Consequently, the capital cost per new transit rider would be among the highest of any commuter rail project, but the capital cost per hour of travel time saving would be among the lowest. There would be little benefit to air quality, because few auto trips would be eliminated. The project is rated high in economic and land-use impacts. All of the existing and proposed new station sites are located in state-designated revitalization areas. Local plans call for high-density residential development near these sites, along with new commercial or industrial development. Most of the stations would be in environmental justice target neighborhoods, and most of the new ones would serve areas that are not currently served directly by rail transit lines to downtown Boston. It is the only commuter rail project with a high rating for service quality, because of its contributions to passenger safety and security, comfort and convenience, and reductions of transfers.

FAIRMOUNT LINE IMPROVEMENTS



SILVER LINE PHASE III: SOUTH STATION–BOYLSTON CONNECTOR

Description

This project would construct a new transitway tunnel from South Station to New England Medical Center station with intermediate stops at Boylston and Chinatown stations. The segment would link Phase 1 of the Silver Line, which runs between New England Medical Center and Dudley, with Phase 2 from South Station to Logan Airport via the World Trade Center. The Phase III segment would also allow for direct transfers from all segments of the combined Silver Line with the Red Line, Orange Line, and Green Line. Silver Line Phase III is an ACO legal commitment (see table 2-2).

Capital Features

Construction of a transitway tunnel with three new underground stations at major transfer points with other rapid transit lines. Purchase of additional dual-mode vehicles.

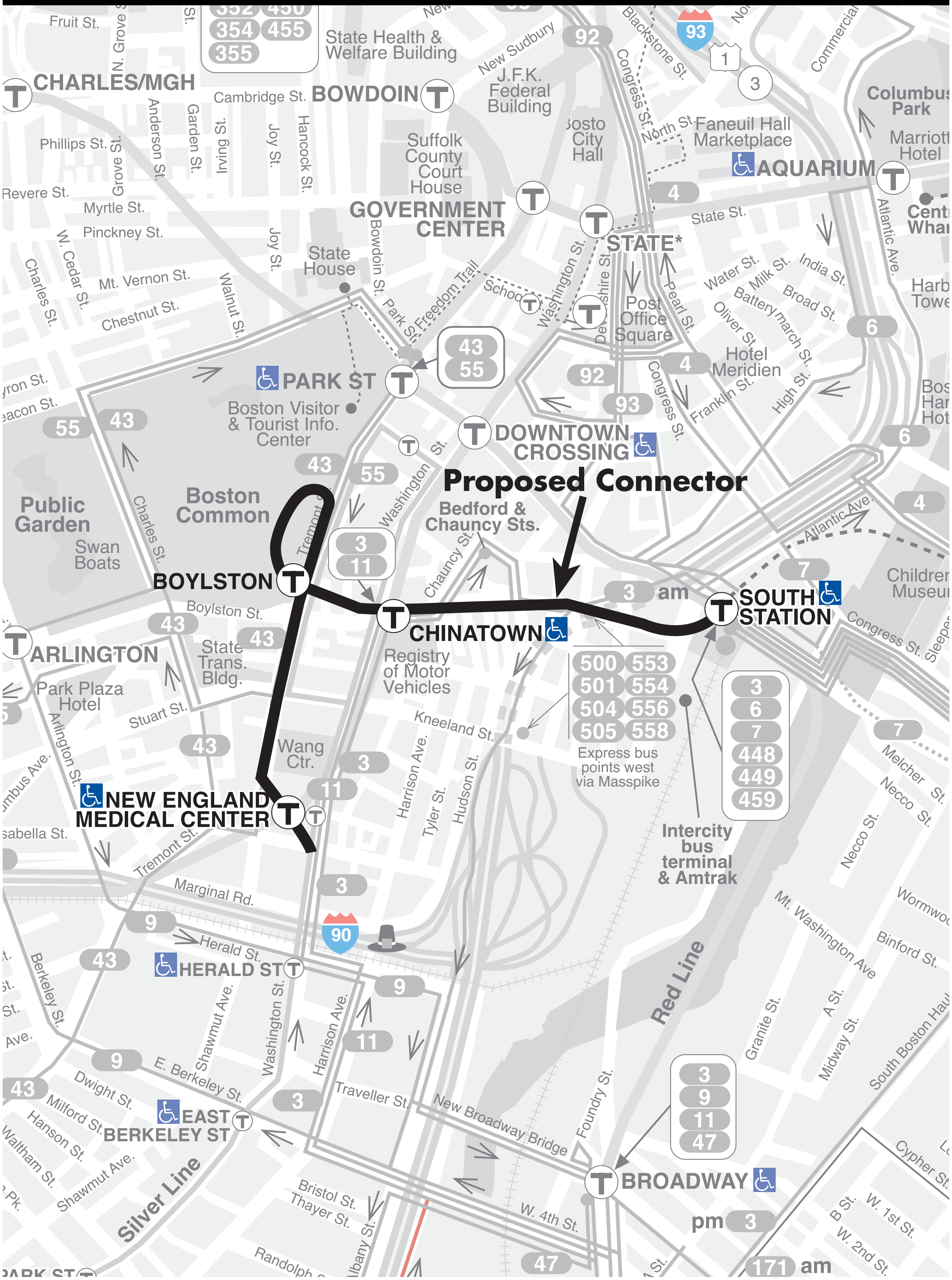
Capital Cost	**$951.9 million (MBTA Planning Dept. estimate)**
Operating Cost	**$2,600 per weekday**
Daily Ridership Increase on Mode	**20,500**
Net Increase in Daily Transit Ridership	**4,500**
Capital Cost/New Transit Rider	**$210,600**
Operating Cost per Wkday/New Transit Rider	**$0.60**
Capital Cost/Travel Time Benefit	**$386,700 per hour**
Operating Cost/Travel Time Benefit	**$1.00 per hour**
Travel Time Savings	**2,462 hours per weekday**

Assessment

This is a high priority rapid transit expansion project. The capital cost for this project would be $951.9 million. This figure is a planning level estimate that includes 50% contingency and inflation based on a projected year of expenditure with completion by 2010. The typical daily operating cost would be $2,600. This project would connect two disconnected segments of the Silver Line and created one through route between Roxbury, Downtown, South Boston, and Logan Airport. The project would attract 20,500 passengers to the mode of which 4,500 would be new transit riders. This project would result in a moderate reduction in air pollution. The anticipated high construction costs result in moderate cost effectiveness per new transit rider despite drawing a large number of new riders. Because the segment of new construction is short and would also result in a combination of two planned or existing services, the operating cost per new passenger would be very low.

The project would provide improved access and connections to the South Boston Waterfront area, which is expected to be an area of high employment growth and mixed use development with residential areas, and would provide improved access from residential areas in Roxbury which are a high priority for environmental justice. Direct transfers would be provided to the Green Line, Orange Line, and the Red Line.

SILVER LINE PHASE III: SOUTH STATION – BOYLSTON CONNECTOR



URBAN RING PHASE 1

Description

The Urban Ring is a multi-phase project. Three phases have been defined and each phase will be additive; that is each new service will add capacity to previous improvements-not replace them. Phase 1 of the Urban Ring consists of a significant expansion in the number of routes and reach of the Crosstown (CT) bus route network within Boston, Brookline, Cambridge, Chelsea, Everett, and Somerville, and the addition of new Express Commuter (EC) service to provide single seat radial and crosstown service from suburban locations into the Urban Ring corridor communities. Phase 1 bus routes will utilize 100 40-foot low-floor CNG powered buses. Maintenance facilities must be expanded to accommodate these vehicles.

Capital Features

Purchase of 100 additional CNG buses and expansion of CNG maintenance facilities.

Capital Cost	**$100.0 million (Urban Ring MIS)**
Operating Cost	**$100,300 per weekday**
Daily Ridership Increase on Mode	**21,400**
Net Increase in Daily Transit Ridership	**5,500**
Capital Cost/New Transit Rider	**$18,200**
Operating Cost per Wkday/New Transit Rider	**$ 18.20**
Capital Cost/Travel Time Benefit	**$72,000 per hour**
Operating Cost/Travel Time Benefit	**$72 per hour**
Travel Time Savings	**1388 hours per weekday**

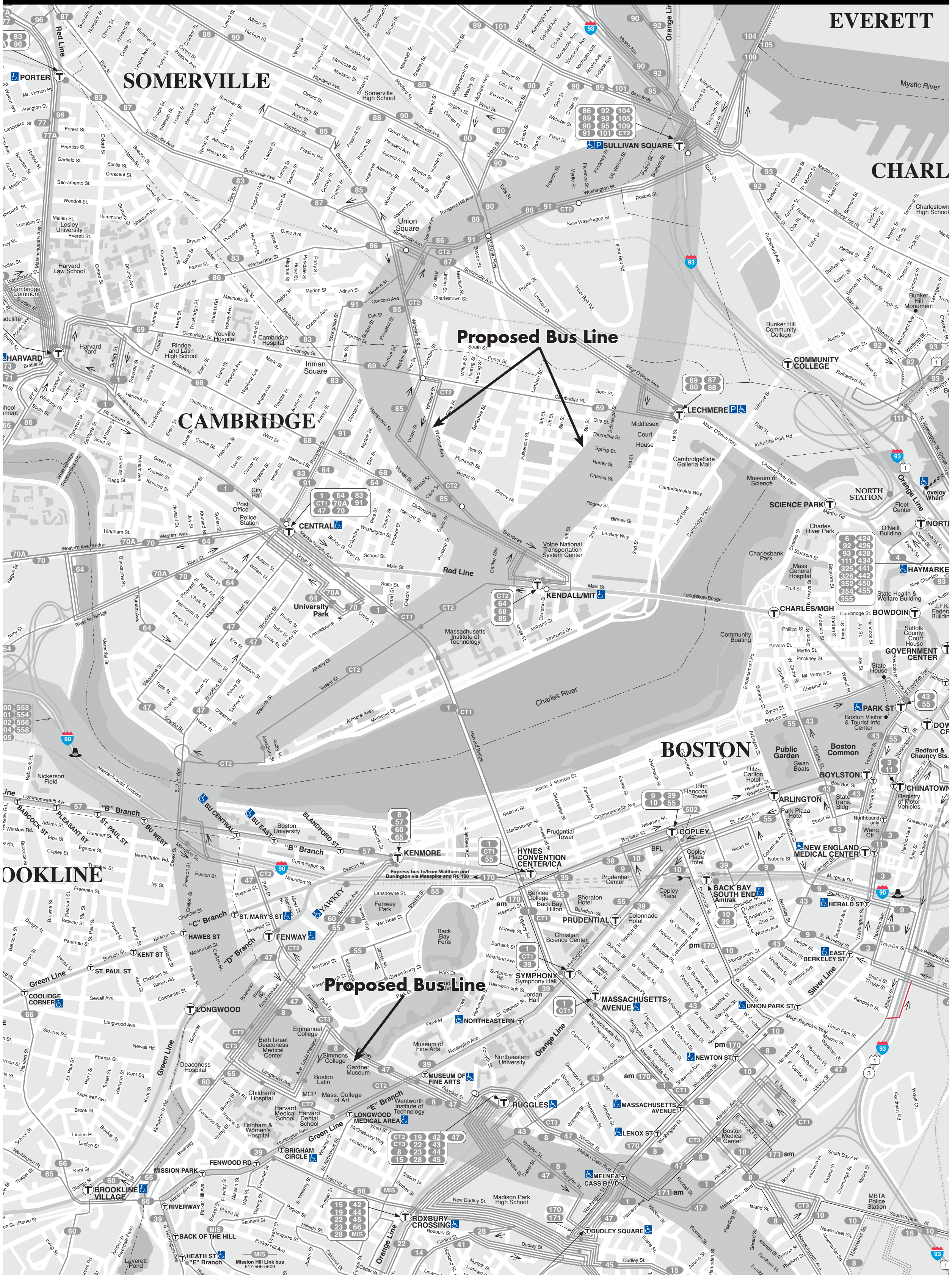
Assessment

This is a high-priority bus expansion project. The capital costs for this project would be $100 million and the typical daily operating costs would be $100,300. This project would attract 21,400 riders to the mode of which 5,500 would be new transit riders. Capital cost per new transit rider would be $18,200 and operating cost per new transit rider would be $18.20. Capital costs would be limited to the acquisition of vehicles and the provision of maintenance facilities for the vehicles. The project would not be very cost effective for either capital or operating costs per new rider compared to other bus/trackless trolley expansion projects. The project would have little impact on air quality.

The service would have high utilization though and would help reduce crowding on other transit services by diverting riders. There would be a moderate impact on mobility, as the Phase I routes serve areas that have other transit alternatives, although total service offered would be increased.

Service quality would improve, as Phase I routes would reduce the amount of transfers required to complete journeys in the urban core area. The routes would serve target neighborhoods for environmental justice including parts of Chelsea, Everett, Somerville, Cambridge, Roxbury, and Dorchester. Existing or proposed employment areas at Logan Airport, Chelsea, Assembly Square, Kendall Square, University Park, Longwood Medical Area, and Crosstown Center would receive direct service from this project. All existing radial rapid transit lines would interface with Urban Ring Phase 1 routes. Riders diverted to the Urban Ring would free up capacity on other parts of the transit network including the Red, Orange, and Green Lines.

URBAN RING PHASE 1



URBAN RING PHASE 2

Description

The Urban Ring is a multi-phase project. Three phases have been defined and each phase will be additive; that is each new service will add capacity to previous improvements-not replace them. Phase 2 of the Urban Ring builds upon the bus routes of Phase 1 by adding seven Bus Rapid Transit (BRT) routes through the Urban Ring corridor. Some of the BRT routes in Phase 2 would be new and others would be modified or upgraded versions of Phase I bus routes. Phase 2 would utilize 60' articulated low-floor, low emission buses, segments of exclusive busway, Intelligent Transportation System (ITS) features, and supporting elements to improve connections with radial transit and commuter rail lines. Among the supporting elements would be new or expanded commuter rail stations at Downtown Chelsea, Sullivan Square, Gilman Square, Union Square, Yawkey, Ruggles, and Uphams Corner.

Capital Features

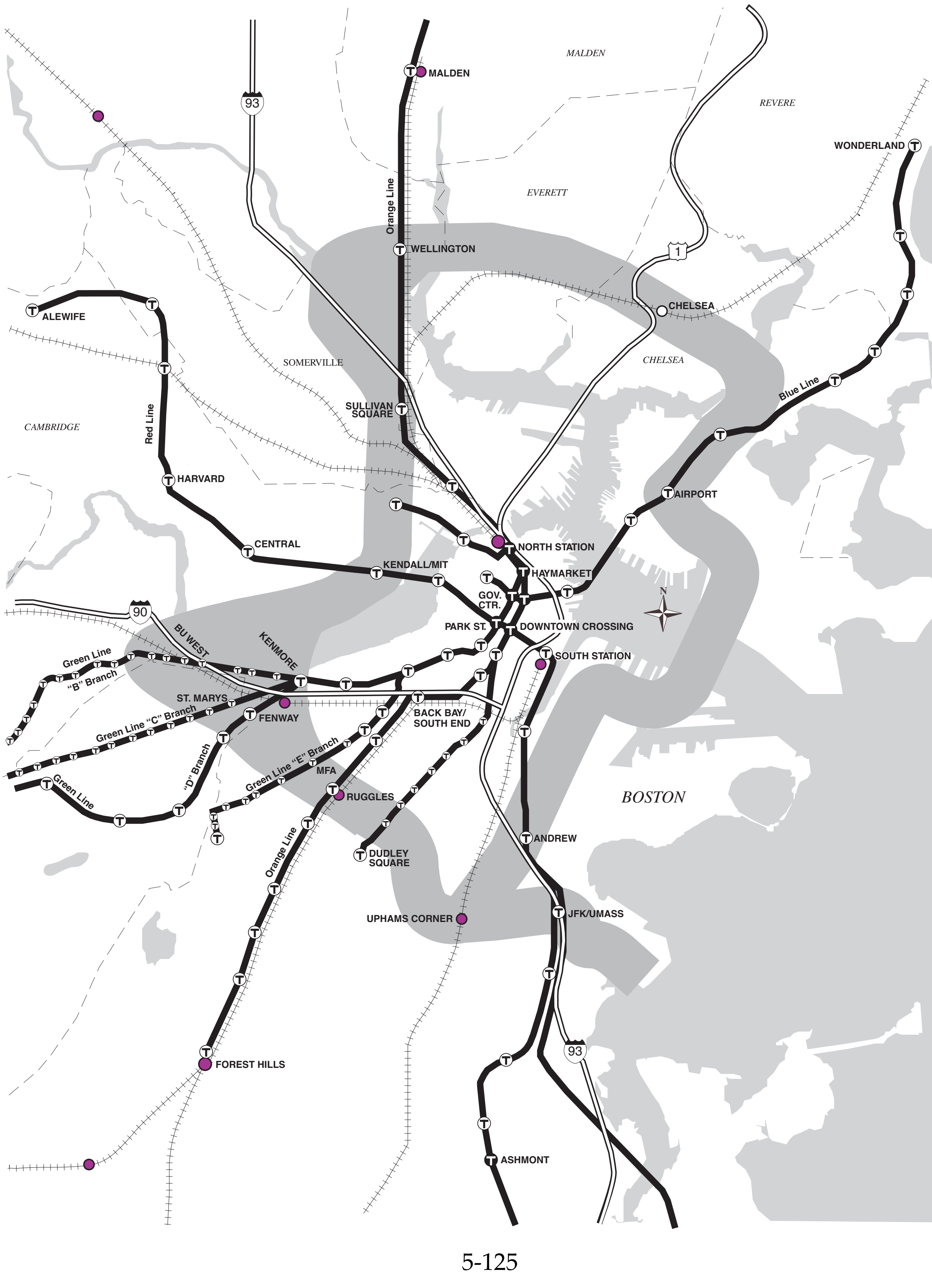
Construction of grade-separated and exclusive lane BRT segments, construction of new or expanded commuter rail stations, installation of signal priority systems for BRT vehicles, and purchase of BRT vehicles.

Capital Cost	**$500.0 million (Urban Ring MIS)**
Operating Cost	**$70,700 per weekday**
Daily Ridership Increase on Mode	**53,000**
Net Increase in Daily Transit Ridership	**15,000**
Capital Cost/New Transit Rider	**$33,300**
Operating Cost per Wkday/New Transit Rider	**$4.70**
Capital Cost/Travel Time Benefit	**$26,800 per hour**
Operating Cost/Travel Time Benefit	**$3.80 per hour**
Travel Time Savings	**18,692 hours per weekday**

Assessment

This is a high priority rapid transit expansion project. The capital costs for this project would be $500 million and the typical daily operating cost would be $70,700. Phase 2 of the Urban Ring would bring in 53,000 riders to the mode of which 15,000 would be new transit riders. The remaining riders would be diverted from other modes. The capital cost per new transit rider would be $33,300. The operating cost per new transit rider would be $4.70. The Urban Ring scores high for cost effectiveness both for capital and operating costs per new transit rider. Improvements to air quality as a result of this project would score highly, thanks to the large number of new transit riders diverted from automobiles. The routes would serve a number of environmental justice target neighborhoods including parts of Everett, Chelsea, Somerville, Cambridge, Roxbury, and Dorchester. Existing or proposed employment areas at Logan Airport, Chelsea, Assembly Square, Kendall Square, Cambridgeport, Longwood Medical Area, and Crosstown Center would receive direct service from this project. This results in a very high rating for land use and economic impacts. All existing radial rapid transit and commuter rail lines would interface with Urban Ring Phase 2 routes. Riders could avoid traveling through Downtown Boston by using the Urban Ring instead of transferring between existing services. Riders diverted to the Urban Ring would free up capacity on other parts of the transit network including the Red, Orange, and Green Lines. Reliability would be improved through the use of dedicated

URBAN RING PHASE 2



D PURCHASE 100 NEW BUSES

Description

The proposal calls for expanding the MBTA bus fleet by 100 vehicles. These additional buses would allow for improved service frequencies on 50 bus routes serving the inner 14 communities of the MBTA service area, including Boston. Routes projected to receive increased service are those with crowding problems, as well as routes operating infrequent service through neighborhoods with high density and high transit dependent populations. Service would be improved in both the peak and off-peak.

Capital Features

Purchase 100 buses.

Capital Cost	**$33.8 million**
Operating Cost	**$45,400 per weekday**
Daily Ridership Increase on Mode	**5,700**
Net Increase in Daily Transit Ridership	**1,400**
Capital Cost/New Transit Rider	**$23,600**
Operating Cost per Wkday/New Transit Rider	**$31.50**
Capital Cost/Travel Time Benefit	**$36,800 per hour**
Operating Cost/Travel Time Benefit	**$49.50 per hour**
Travel Time Savings	**918 hours per weekday**

Assessment

This is a medium-priority bus enhancement project. The capital cost for this project would be $33.8 million and the increase in typical daily operating costs would be $45,400. This project would attract 5,700 additional riders to urban bus routes, of which 1,400 would be new transit riders. The capital cost per new rider would be $23,600 and the operating cost per new rider would be $31.50. The cost effectiveness of this project would be moderate compared to other bus enhancement projects. There would be minimal air quality improvements associated with this project. This project would help reduce crowding conditions on existing bus routes and would provide improved service frequencies to a number of environmental justice target communities in the urban core. There would be a high increase in riders who are new to the mode, but only a moderate increase in new transit riders.

Source: Program for Mass Transportation

No Map Available

Buses will service the Inner 14 communities of MBTA service area, including Boston

D CONSTRUCT ORANGE LINE STATION AT ASSEMBLY SQUARE

Description

This project would add a station on the existing Orange Line at the Assembly Square development in Somerville, between Sullivan Square Station in Charlestown and Wellington Station in Medford.

Capital Features

This project would consist of one new rapid transit station, but would not add any route mileage.

Capital Cost	**$29.3 million (MBTA Planning Dept. estimate)**
Operating Cost	**None, unless demand requires more frequent service**
Daily Ridership Increase on Mode	**1,700**
Net Increase in Daily Transit Ridership	**1,100**
Capital Cost per New Transit Rider	**$26,900**
Operating Cost per Wkday/New Transit Rider	**None, unless demand requires more frequent service**
Capital Cost/Travel Time Benefit	**$145,700 per hour**
Operating Cost/Travel Time Benefit	**None, unless demand requires more frequent service**
Travel Time Savings	**201 hours per weekday**

Assessment

Overall, this project is rated medium priority. It would add a station in a section of Somerville that the Orange Line currently runs through without stopping. This would be one of the least costly of all rapid transit expansion projects analyzed, both in absolute terms and relative to the new ridership attracted. Because of its location relative to roads, other transit stations, and most of the population of Somerville, such a station would be of use mostly for travel to and from the Assembly Square redevelopment. At this time, the mix of uses in this project has not been finally determined, making demand projections difficult. Adding an Assembly Square station would increase travel times slightly for passengers riding between stations further north and stations further south, and could worsen crowding on trains during peak hours. It gets a high rating in economic and land use impact because the station would be in a state-designated revitalization area. This includes a brownfield site. Several mixed-use transit-oriented development projects are under consideration for this location. The project receives a medium rating for environmental justice since the station is not located in a minority or transit-dependent neighborhood.

Source: Program for Mass Transportation

CONSTRUCT ORANGE LINE STATION AT ASSEMBLY SQUARE

NORTH SHORE TRANSIT IMPROVEMENTS

This project would extend the Blue Line rapid transit line 4.5 miles from Wonderland Station in Revere to Central Square, Lynn. The alignment would either be parallel to the Newburyport/Rockport commuter rail line or it would make use of the abandoned narrow gauge right of way through Oak Island Center and Point of Pines Center. The MBTA is currently evaluating these options as part of its Draft Environmental Impact Statement (DEIS) for the Revere to Salem corridor. The DEIS will provide additional details on the relative benefits of each alignment. The extension would also include a crossing of the Saugus River, which is a navigable waterway. Consequently, a bridge there would need to accommodate both large vessels on the river and high-frequency rapid transit service.

Capital Features

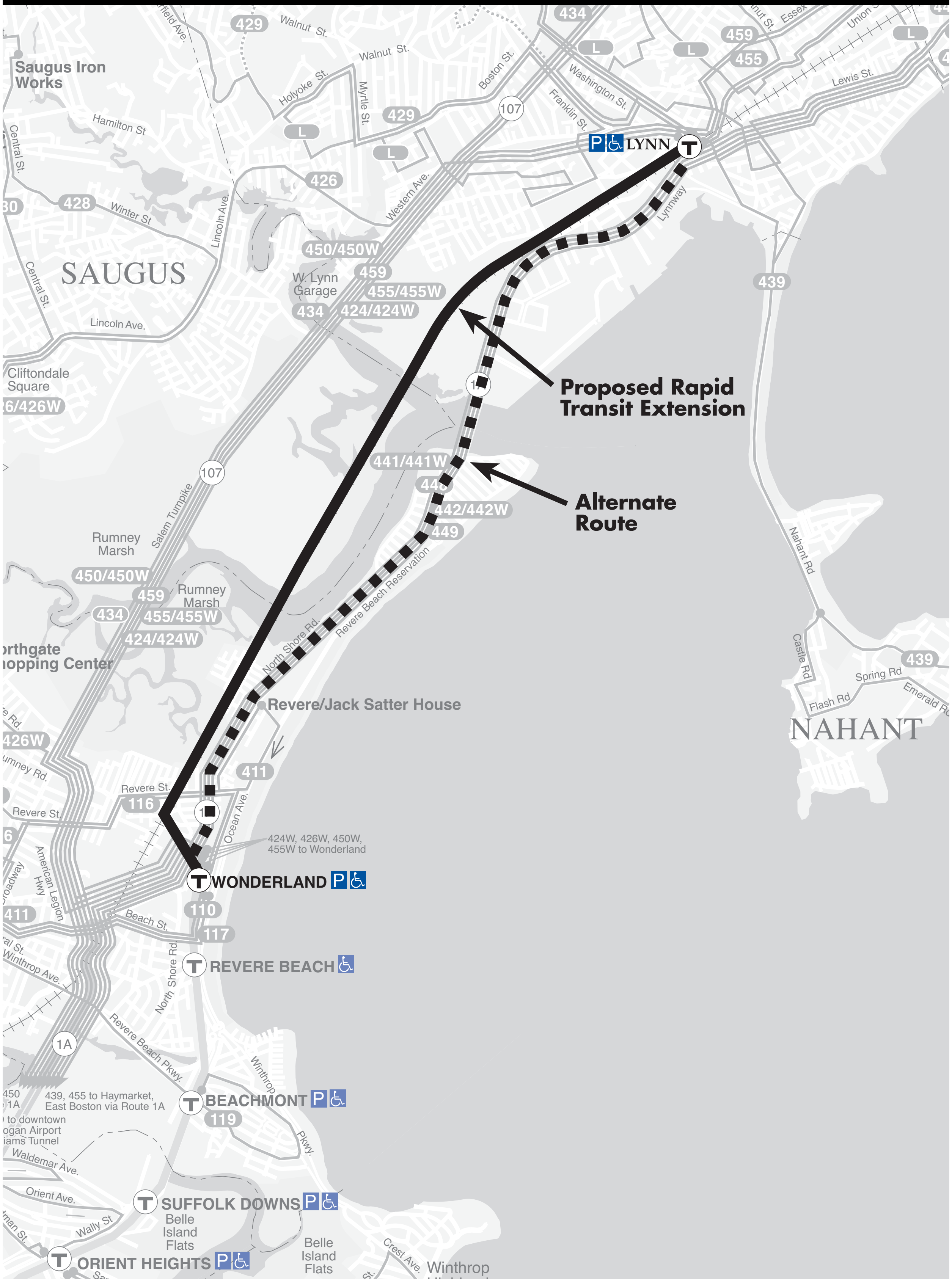
Rapid Transit line extension including a major river crossing, possible wetlands mitigation requirements, two potential new stations, and purchase of additional Blue Line vehicles.

Capital Cost	**$357.6 million (CTPS estimate)**
Operating Cost	**$72,500 per weekday**
Daily Ridership Increase on Mode	**21,000**
Net Increase in Daily Transit Ridership	**7,900**
Capital Cost/New Transit Rider	**$45,300**
Operating Cost per Wkday/New Transit Rider	**$9.20**
Capital Cost/Travel Time Benefit	**$355,800 per hour**
Operating Cost/Travel Time Benefit	**$72.10 per hour**
Travel Time Savings	**1005 hours per weekday**

Assessment

This is a high priority rapid transit expansion project. The capital cost for the project would be $357.6 million and the typical daily operating cost would be $72,500. Extending Blue Line service to Lynn would attract 21,000 new rapid transit riders of which 7,900 would be new transit riders. The remaining 13,100 would be diverted from MBTA bus routes and from the Rockport/Newburyport commuter rail line. The capital cost per new transit rider would be just over $45,000 and the operating cost per new rider would be $9.20. The extension is expected to have major land use and economic impacts on Lynn, particularly in the downtown area, which is a state designated revitalization area with substantial commercial and residential development. Lynn is considered a target area for projects providing environmental justice. Service quality would improve for those passengers now riding MBTA bus service in the area, as transfers would be reduced, travel times to Boston would be improved compared to the bus mode, and frequency of service would be greatly expanded. The extension would provide for transfers between the Newburyport/Rockport commuter rail line and the Blue Line at Lynn Station, and improve access to Logan Airport from locations on the North Shore.

NORTH SHORE TRANSIT IMPROVEMENTS



Maintenance and Improvement Projects

Most of the work of the MPO in the future will be devoted to the maintenance and improvement of its existing infrastructure. For the most part, this work does not add capacity to the system. Rather, it extends the life or modernizes existing components of the system or provides capital enhancements that improve operations. These types of projects are funded under the 70% of revenues (highway and transit) that the MPO has reserved for maintenance and improvement of the existing system and are not specifically listed in the regional transportation plan.

Bridge maintenance and rehabilitation
Over the next twenty-two years, the MPO will need to fund the maintenance of the region's bridges. This includes replacing bridge decks, reconstructing bridges, painting bridges, and performing other routine or periodic maintenance. Where appropriate, such as the Boston to Worcester corridor, bridge maintenance and rehabilitation will include providing sufficient vertical clearance to permit double-stack freight movement. A new bridge providing a connection that does not currently exist would be considered a regionally significant project and must be listed in Tables 5-1 and 5-3. Based on recent trends, the MPO estimates that approximately 31% of the highway funding for maintenance and improvement of the regional system will be allocated to bridge maintenance and rehabilitation.

Interstate Maintenance
MassHighway oversees the interstate maintenance program and ensures that the system of interstate highways within the region are maintained to an acceptable standard. Work under this category includes reconstruction, resurfacing, signage, striping and other routine or periodic maintenance. Based on recent trends, the MPO estimates that approximately 10% of the highway funding for maintenance and improvement of the regional system will be allocated to interstate maintenance.

Roadway Maintenance
MassHighway maintains an ongoing pavement management program to rate the serviceability of the pavement of the region's roadways. Pavement maintenance may be accomplished through surface patching, roadway resurfacing, or full-depth reconstruction. Based on recent trends, the MPO estimates that approximately 35% of the highway funding for maintenance and improvement of the regional system will be allocated to roadway maintenance.

Safety

Safety projects address specific roadway safety issues identified through data analysis performed by the MPO and MassHighway. Safety projects include a hazard elimination program, shoulder improvements, and intersection realignments. The MPO maintains a GIS database of crash locations and is able to rank intersections or stretches of roadway most in need of improvement. These rankings are done for motor vehicle, bicycle, and pedestrian modes. Based on recent trends, the MPO estimates that approximately 8% of the highway funding for maintenance and improvement of the regional system will be allocated to safety projects.

Intersection/Signal Improvements

This category includes intersection channelization projects, signal upgrades, and realignments. This category does not include intersections or segments of roadway that add additional roadway capacity. Capacity adding projects are subject to air quality conformity analysis and must be specifically identified in Tables 5-1 and 5-3. Based on recent trends, the MPO estimates that approximately 5% of the highway funding for maintenance and improvement of the regional system will be allocated to intersection improvements.

Enhancement Projects

The MPO will continue to fund various types of transportation enhancement activities including but not limited to acquiring scenic easements, preserving historic transportation infrastructure and providing landscaping, streetscaping and other beautification projects. Based on recent trends, the MPO estimates that approximately 5% of the highway funding for maintenance and improvement of the regional system will be allocated to enhancement projects.

Bicycle and Pedestrian Projects

The MPO will continue to fund trails, pedestrian amenities and other enhancement projects. Improvements for bicyclists and pedestrians are a routine aspect of roadway reconstruction projects and are funded under roadway maintenance. Based on recent trends, the MPO estimates that approximately 2% of the highway funding for maintenance and improvement of the regional system will be allocated to bicycle and pedestrian projects.

Intelligent Transportation Systems (ITS)

ITS has been employed and will continue to be employed by Boston Region MPO transportation agencies. The Massachusetts Turnpike Authority has instituted the FastLane program. Massport has instituted an automated vehicle identification system to improve revenue control at its parking facilities; has installed closed circuit television to improve security, assist with incident detection and provide enhanced curbside management; and has installed

variable message signs to improve landside traffic information. The MBTA is in the process of instituting an Automated Fare Collection (AFC) system and is constructing a state-of-the-art bus control center. MassHighway is developing a statewide ITS protocol and has installed variable message signs on selected routes. Based on recent trends, the MPO estimates that approximately 2% of the highway funding for maintenance and improvement of the regional system will be allocated to regional ITS highway projects. It is difficult to determine a percentage of transit funding under this category because many ITS components are done as part of specific expansion and enhancement projects throughout the system. An example is the Silver Line project that includes global positioning systems and signal prioritization.

Regional Mobility Improvement Program

The program funds will be used for capital equipment and other capital related expenditures of high occupancy vehicle services and programs that improve the mobility of residents in areas currently unserved or underserved by transit. This program will operate mostly in suburban areas of the MPO region not currently served or underserved by fixed-route bus services. The program's design will be flexible to allow for both the acquisition of capital equipment or for the leasing costs associated with capital equipment from an already established transportation service provider, so as to realize the most cost-effective utilization of equipment based on the needs of specific area residents and workers.

Potential services associated with this program (for which capital costs would be eligible) include fixed route shuttles serving markets not typically addressed (i.e. suburb to suburb, reverse commute, etc.), employer-based van/car pool services, and flexible (or “deviated”) route shuttle services.

Eligible applicants may include be local or regional public entities, recognized Transportation Management Associations serving theregion, or other approved non-profit entities capable of implementing such projects. Project proposals will be reviewed based on a set of specific criteria to be applied by a review committee. Matching requirements will adhere to all federal requirements and include the provision of a 20% non-federal match.

Transportation Demand Management is also included in this category. This includes both capital and operating measures for shuttle services, park and ride lots, and bicycle projects. Currently, there are twelve Transportation Management Associations within the region working to provide commuters with alternatives to driving alone. As the roadway network becomes more congested, the importance of efficiently managing the use of the roadways will become even more critical.

Based on recent trends, the MPO estimates that approximately 2% of the highway funding for maintenance and improvement of the regional system will be allocated to the Regional Mobility Improvement Program.

Parking Expansion and Maintenance
The MPO is committed to increasing the available parking capacity at various commuter rail and transit stations throughout the region. Unlike most of the other projects funded under the 70% maintenance and improvement program, the addition of parking spaces to the public transportation system is included in the regional travel demand model. The MBTA's current plans envision adding over 9,500 spaces at a cost of approximately $193.4 million as outlined below in Table 5-5. Additional parking facilities will be constructed over the lifetime of this Plan based on prioritization in the PMT. The MBTA anticipates using myriad funding sources for these projects including federal funds allocated to the MBTA; federal funds allocated to other RTA's for use on the commuter rail system; and federally earmarked, MBTA, local, private, and state bond funds. The MPO estimates that approximately 5% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Table 5-5
The MBTA Planned Parking Program

Line	New Spaces	Cost
Newburyport/Rockport Commuter Rail	2,032	$49,400,000
Haverhill Commuter Rail	546	$14,500,000
Lowell Commuter Rail	609	$15,500,000
Fitchburg Commuter Rail	858	$27,700,000
Worcester Commuter Rail	565	$7,000,000
Franklin Commuter Rail	500	$6,000,000
Alltleboro/Providence Commuter Rail	930	$20,000,000
Plymouth/Kingston Commuter Rail	550	$6,000,000
Middleborough/Lakeville Commuter Rail	500	$7,000,000
Red Line	1,928	$30,300,000
Green Line	550	$10,000,000
Total	9,568	$193,400,000

Accessibility
The MBTA is working toward full compliance with the Americans with Disabilities Act (ADA) through the Key Stations Plan. Current and future work

will focus on bringing the Green Line (vehicles and stations) and the few remaining Red Line stations along the Ashmont branch into compliance. In many cases, station modernization programs incorporate the provision of accessibility. The MPO estimates that approximately 18% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Revenue Vehicles

The revenue vehicle fleet is one of the most visible and important components of the MBTA service network. It is composed of rapid transit vehicles, light rail vehicles, commuter rail passenger coaches and locomotive units, diesel motor bus coaches, compressed-natural-gas buses, hybrid buses, electric trackless trolleys, RIDE vehicles, and passenger ferries. The MBTA must maintain a schedule of rehabilitation and replacement of its vehicle fleet. The MPO estimates that approximately 31% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Non-Revenue Vehicles

Non-revenue vehicles include both non-revenue and work equipment and are used for maintenance, safety, field supervision, and revenue collection. The MPO estimates that approximately 1% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Track

The MBTA currently operates rapid transit and light rail-service over 185 miles of track and commuter rail over 1300 miles of track and must maintain its track in good working order. The MPO estimates that approximately 5% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Signals

Train control is an integral part of an operating transit system. The signal system's primary goal is maintaining train separation while attempting to minimize headways and runtimes. The MPO estimates that approximately 17% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Communications

Communications include maintaining an extensive inventory of equipment and overseeing contract services for two-way radio systems, security systems, fire alarms, telephones, police/public call boxes, closed-circuit television, public address systems, light-emitting diode (LED) signs, and the Supervisory Control and Data Acquisition (SCADA) system. The MPO estimates that approximately

1% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Power

The MBTA runs power through it own distribution equipment. The power system includes cables, substations, circuit breakers, switch boxes and heaters, manholes, ductiles, switchboards, and the catenary system for the Green Line and Blue Line, as well as overhead wire networks for the trackless trolley lines. The MPO estimates that approximately 4% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Yard and Shop

Maintenance facilities, or yards and shops, are where the MBTA conducts regularly scheduled maintenance and emergency repairs on its vehicle fleets. The MPO estimates that approximately 4% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Stations

The MBTA has stations along its rapid transit lines, light-rail lines, commuter rail, Silver Line, bus route and docking facilities for ferries that must be maintained and updated. The MPO estimates that approximately 4% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Facilities (including bus shelters)

This category includes all administrative buildings for the system, ventilation structures, layover facilities, maintenance and storage buildings, bus shelters, and docking facilities. The MPO estimates that approximately 1% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Elevators and Escalators

The MBTA has 100 elevators and 132 escalators located throughout the system that must be maintained. The MPO estimates that approximately 1% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Tunnels, Retaining Walls and Culverts

The MBTA must maintain its 19 miles of tunnels, retaining walls, and 783 culverts throughout the system. The MPO estimates that approximately 3% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Bridges
The MBTA must maintain its 560 bridges made up of 412 railroad bridges, 60 transit bridges, and 88 highway bridges (carrying vehicles over track and rights-of-way). The MPO estimates that approximately 3% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Fare Equipment
The MBTA must maintain and upgrade its fare-collection equipment throughout the system. The MPO estimates that approximately 3% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Administration
Administration includes the MBTA's cost of conducting business. The MPO estimates that less than 1% of the transit funding for maintenance and improvement of the regional system will be allocated toward this category.

Model Results and Interpretations of the Recommended Plan

Shown in Table 5-6 are the results of the travel model. As seen, the population in this region is projected to increase by 8.7% between 2000 and 2025. During the same time period, the employment is projected to grow by 17.6%. On a typical weekday, the overall level of trip making regardless of mode, is estimated to increase from 16.75 million trips in 2000 to 19.13 million trips in 2025. This represents roughly over 0.5% annual growth over the next 25 years.

The No-build Alternative

Transit Trips

In 2000, observed data indicate there were approximately 775,000 linked transit trips on a typical weekday. In 2025, this number is projected to reach about 966,000 under the no-build scenario, a 25% increase. The auto trips on the other hand are projected to increase by roughly 10% and the non-motorized trips by 16.5% between 2003 and 2025. The regional transit mode share increases from 6.46 in 2000 to 7.27 % in 2025 under the no-build case. Increasing levels of highway congestion in 2025 and the addition of some transit projects such as the Silver Line Phase II to the system are the main reasons for the improved future-year transit mode share.

Table 5-6
Travel Model Results

Regional Level	Year 2000 Base Year	Year 2025 No-build	Percent Growth	Year 2025 Build	Increase from No-Build	Percent Growth over No-build
Demographic Forecasts						
Population	4,308,800	4,685,500	8.7 %	4,685,471		
Employment	2,412,800	2,837,300	17.6 %	2,837,324		
Households	1,643,950	1,910,750	16.2 %	1,910,756		
Travel Demand Forecasts						
Trip Productions	16,754,800	19,131,600	14.2 %	19,131,592		
Trip Attractions	16,754,800	19,131,600	14.2 %	19,131,583		
Linked Transit Trips	775,000	966,050	24.7 %	1,039,964	73,914	7.65 %
Auto Person Trips	11,225,600	12,322,000	9.8 %	12,256,375	-65,625	-0.53 %
Non-Motorized trips	2,384,400	2,777,700	16.5 %	2,769,405	-8,295	-0.30 %
Transit Mode Split	6.46 %	7.27 %	12.6 %	7.81 %		
Total Commuter Rail Ridership	130,400	181,250	39.0 %	195,850	14,600	8.06 %
Commuter Rail Ridership (North)	46,900	67,250	43.4 %	72,100	4,850	7.21 %
Commuter Rail Ridership (South)	83,500	114,000	36.5 %	123,750	9,750	8.55 %
Rapid Transit Ridership	670,200	798,300	19.1 %	772,300	-26,000	-3.26 %
Blue line Ridership	59,000	72,150	22.3 %	110,650	38,500	53.36 %
Orange Line Ridership	167,500	198,550	18.5 %	186,550	-12,000	-6.04 %
Red Line Ridership	237,000	281,250	18.7 %	232,550	-48,700	-17.32 %
Green Line Ridership	206,700	246,350	19.2 %	242,500	-3,850	-1.56 %
Silver Line Ridership	13,000	27,250	109.6 %	101,200	73,950	271.38 %
Urban Ring BRT	n/a	n/a		86,400		
Local bus Ridership	345,500	427,500	23.7 %	452,450	24,950	5.84 %
Express bus Ridership	24,400	39,600	62.3 %	43,550	3,950	9.97 %
Total Vehicle Trips (modeled)	9,613,400	10,587,600	10.1 %	10,553,030	-34,570	-0.33 %
Average Highway Speed	27.2	26.7	-1.7 %	26.73		
VMT	79,040,650	89,694,650	13.5 %	89,735,000	40,350	0.04 %
VHT	2,614,900	3,097,900	18.5 %	3,013,570	-84,330	-2.72 %

Transit demand constrained to future year parking lot capacities

As seen in Table 5-6, the commuter rail system would carry about 181,250 trips a day in the no-build case in 2025 which represents a 39% increase from the current levels. The ridership on the rapid transit system is projected to increase by approximately 19%. The highest increase, about 22 percent would be in Blue Line ridership, which is mainly due to the capacity and service improvements resulting from the Blue Line modernization project. The local bus ridership is projected to increase by roughly 23%; most of this is tied to the projected increase for the rapid transit system (feeder trips). The daily ridership on the express bus system is projected to increase by nearly 63%. This large increase is mainly due to the parking constraints that would exist on the commuter rail system in 2025, causing diversion to the express bus system.

Highway Trips

On the highway side, there were about 9.6 million vehicle trips per day using the roadway system in 2000 within the Boston MPO region. This number is projected to increase by 10% to 10.58 million vehicle trips a day. The average speed on the highway system would actually improve slightly as a result of the completion of major highway projects such as the Central Artery. The total vehicle miles traveled on the region's highway network is projected to increase from 79 million in 2000 to 89.6 in 2025 under the no-build case. Most of this increase is due to the demographic growth being projected between 2003 and 2025.

The Build Alternative

Transit Trips

The build alternative consists of several new transit projects in addition to what is assumed for the no-build case. These include the Red-Blue connector, the North Shore Transit Improvements, Silver Line Phase III, Urban Ring Phase II, a new Orange Line station at Assembly Square, Green Line extension to Medford Hillside and 100 new buses. The impact of adding all these new transit projects is that there would be approximately 74,000 new transit trips in the system in 2025. About 65,500 of these would be as a result of diversion from the auto mode and the remaining 8,500 trips would be coming from the non-motorized mode. The addition of all the new transit projects described above would increase the regional mode share from 7.27 % in the no-build to 7.81 % in the build case.

As seen from Table 5-6, the commuter rail ridership in the build case increases by 8% compared to the no-build. Some of this increase is attributed to the Urban Ring project, which provides intermodal connections at virtually every commuter rail line in the system. The remaining increase is due to interaction of

other new transit projects with the commuter rail network. The Urban Ring project has the effect of significantly reducing congestion on the existing subway system as passengers take advantage of the increased access that the project provides to most Urban Ring destinations. The Silver Line Phase III also reduces the Red Line ridership significantly because it eliminates transfers. At the same time, projects such as the Red-Blue connector, the North Shore Transit Improvements, and the Green Line extension to Medford Hillside would increase the number of trips made on the Blue and the Green lines. The combined effect of all these projects would result in a substantial increase in Blue Line ridership (53%), a moderate decrease in Red Line ridership (17%) and a small decrease in Green and Orange line ridership.

Highway Trips

Within the Boston MPO region, the future year highway demand is projected to decrease very slightly (less than 1%) in the build case. This is mostly due to the transit projects described above. The average speed on the highway network is projected to remain unchanged. Though there is a small decrease in the number of highway trips, the VMT is projected to increase very slightly. This results because travelers in large urban areas usually seek to minimize their travel time. Many highway improvements in the build case, such as added freeway capacity, will divert travelers from shorter distance surface street routes to longer distance but faster routings over the newly improved roadway. If enough of this kind of route diversion occurs, the systemwide average auto trip-length can increase slightly. This is exactly what will occur in the Build scenario because of the numerous highway improvement projects.

CHAPTER 6: ENVIRONMENTAL JUSTICE ASSESSMENT OF THE TRANSPORTATION SYSTEM

In order to comply with its policy promoting the equitable sharing of the transportation system's benefits and burdens, the MPO conducts both the ongoing consultation process on environmental justice (discussed in Chapter 3) and a detailed system-level analysis of transportation equity in the region. The MPO has established an under standing with the Environmental Justice Committee to guide the development of a method and apply measures for assessing the benefits and burdens of the region's existing transportation system. The measures focus on mobility, accessibility, and environmental impact concerns. This work also evaluates this Plan's effects for low income and minority populations in the region.

Environmental Justice Definition

In 2002, in collaboration with the Ad Hoc Environmental Justice Committee, the MPO adopted the following definition of Environmental Justice:

> "Environmental Justice requires the MPO to examine the benefits and burdens, historically, currently, and planned in the future to ensure that minority and low income communities are treated equitably in the provision of transportation services and projects"

This is the foundation guiding MPO policy and the environmental justice analysis.

The Populations of Concern

The populations of concern represent specific populations groups and target neighborhoods within the Boston MPO region that were identified by the Environmental Justice Committee for analysis. The target populations were picked in order to perform a system wide mobility, accessibility, and environmental analysis based on traffic analysis zones (TAZ).

A TAZ represents an aggregation of census geography based on population and numbers of trips. The TAZ was the geographic unit for the analysis.

The target populations include:

- Low Income – The MPO median household income in 2000 was approximately $55,800. A low income TAZ was defined as having a median household income at or below 75% of this level ($41,850). Please

refer to Figure 6-1 and 6-2 for a map showing the distribution of low income population areas.

- Minority – 21.4% of the MPO population in 2000 was made up of minorities (non-white and Hispanic). A minority TAZ was defined as having a percentage of minority population greater than 21.4%. Please refer to Figure 6-1 and 6-2 for a map showing the distribution of minority population areas.
- English as a Second Language (ESL) – 4.1% of the MPO residents age 5 years and older were unable to speak English in 2000. An ESL TAZ was defined as an area in which 4.1% of residents 5 years and older were unable to speak English. Please refer to Figure 6-3 and Figure 6-4 for a map showing the distribution of ESL population areas.
- Zero Vehicle Households (0VHH) – Approximately 15.4% of households in the Boston MPO region owned no motor vehicle in 2000. A 0VHH TAZ was defined as an area in which more than 15.4% of all households were without autos. Please refer to Figure 6-5 and 6-6 for a map showing the distribution of 0VHH population areas.

The 2025 demographic forecasts assumed the same distribution for the population of concern as was observed in the 2000 census and grew at the same rate as the surrounding populations based on the MAPC population forecasts. The build scenario for 2025 used the same demographic forecasts as were in used in the 2025 no-build. The results of these criteria are presented in Table 6-1.

Table 6-1: Target Populations & Thresholds

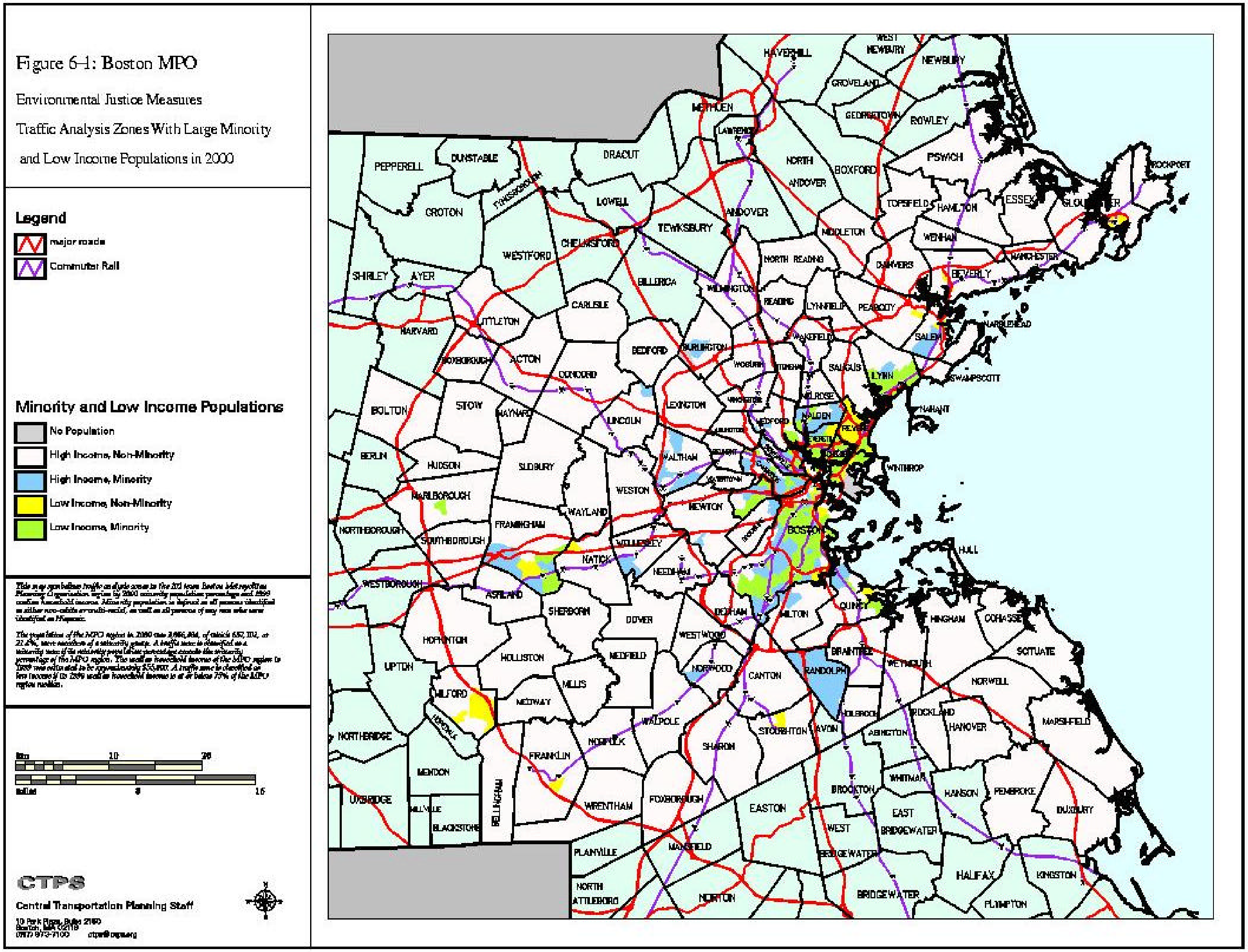
Selected Demographic Profiles of Populations & Non-Populations of Concern	2000 Base Year	Threshold by TAZ
MPO (101 Communities) Population	3,066,200	na
MPO (101 Communities) Households	1,277,500	na
Low-Income Households	319,400	Households less then $41,850
Non Low-Income Households	958,100	Households greater then $41,850
Minority Populations	657,100	Minority populations greater then 21.4%
Non-Minority Populations	2,409,100	Minority populations less then 21.4%
ESL Population	118,100	ESL populations greater then 4.1%
Non-ESL Population	2,948,100	ESL populations less then 4.1%
Zero Vehicle Households	442,300	Zero vehicle households greater then 15.4%
Non-Zero Vehicle Households	835,200	Zero vehicle households less then 15.4%

Source: CTPS – 5/2003

Figure 6-1: Boston MPO

Environmental Justice Measures

Traffic Analysis Zones With Large Minority and Low Income Populations in 2000



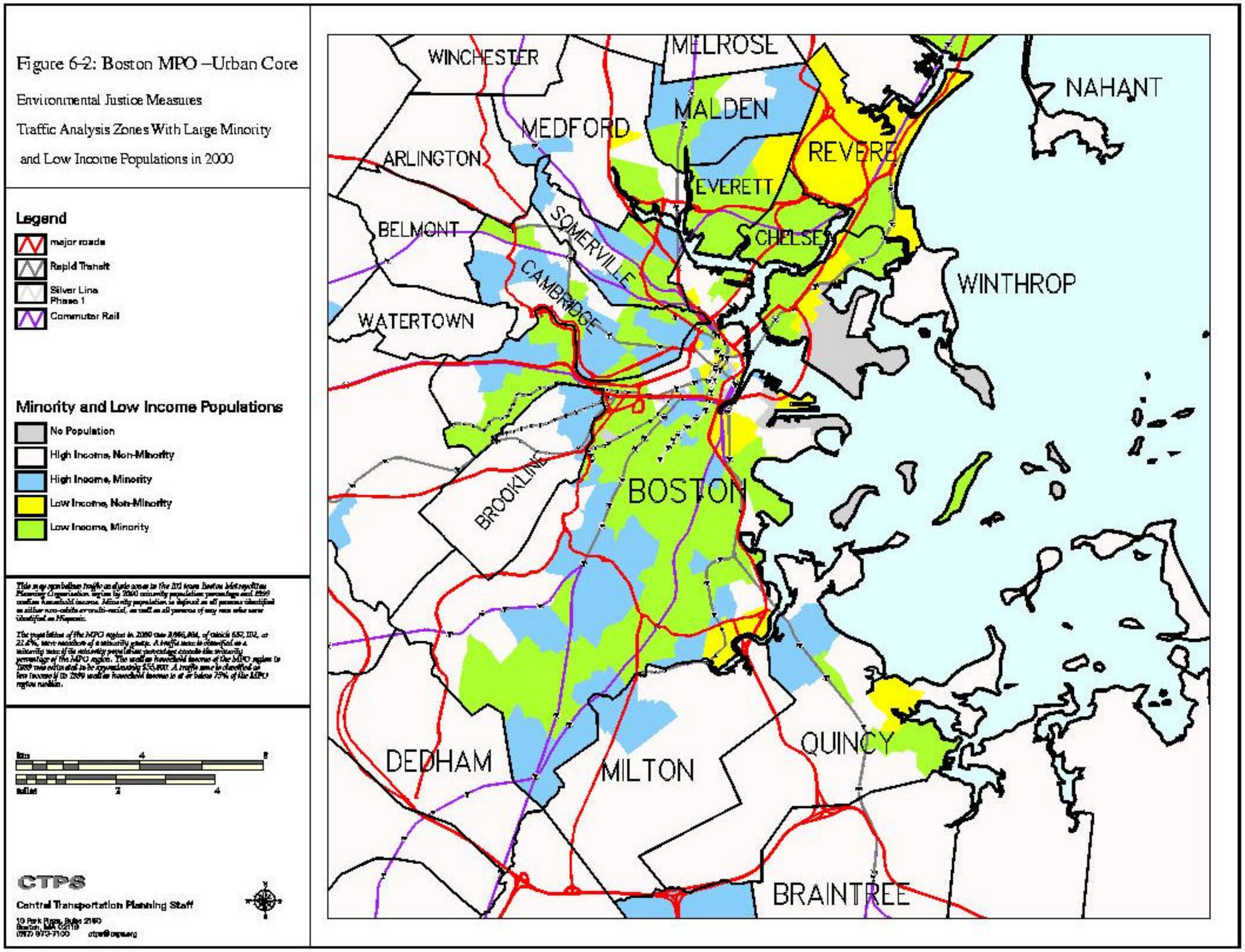


Figure 6-2: Boston MPO –Urban Core

Environmental Justice Measures

Traffic Analysis Zones With Large Minority and Low Income Populations in 2000

Figure 6-3: Boston MPO

Environmental Justice Measures

Traffic Analysis Zones With Significant

Non-English-Speaking Populations in 2000

Legend

major roads

Commuter Rail

Non-English-Speaking Population

No Population

0 To 4.1% Non-English Speaking

More Than 4.1% Non-English Speaking

This map symbolizes traffic analysis zones in the 101 town Boston Metropolitan Planning Organization region by their degree of linguistic isolation. Linguistic isolation is defined as the ability to speak English either "not well" or "not at all."

The population age 5 and over of the MPO region in 2000 was [illegible], of which [illegible], or 4.1%, spoke English either not well or not at all.

kms 10 20

miles 5 15

CTPS

Central Transportation Planning Staff

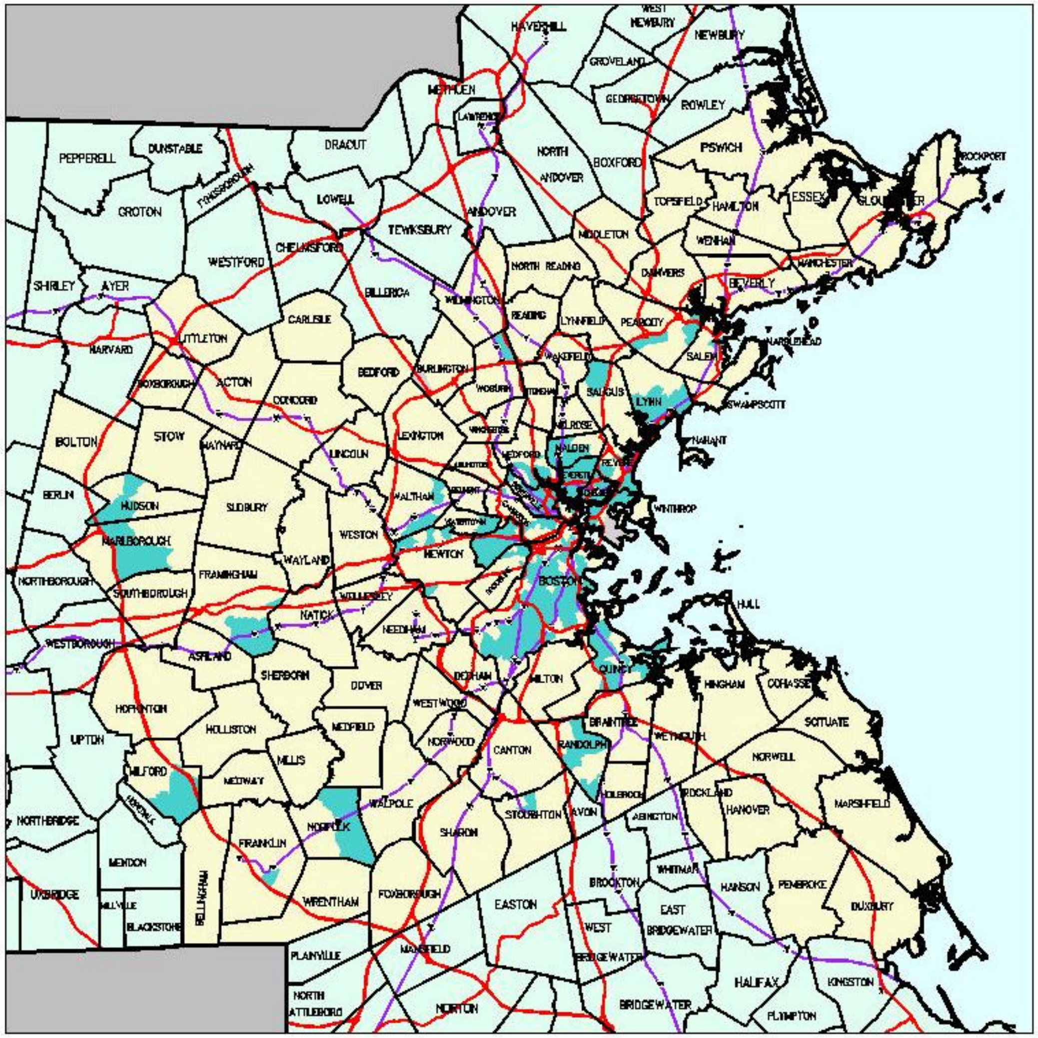


Figure 6-4: Boston MPO –Urban Core

Environmental Justice Measures

Traffic Analysis Zones With Significant Non-English-Speaking Populations in 2000

Legend

- major roads
- Rapid Transit
- Silver Line Phase 1
- Commuter Rail

Non-English-Speaking Population

- No Population
- 0 To 4.1% Non-English Speaking
- More Than 4.1% Non-English Speaking

This map symbolizes traffic analysis zones in the 101 town Boston Metropolitan Planning Organization region by their degree of linguistic isolation. Linguistic isolation is defined as the ability to speak English either "not well" or "not at all."

The population age 5 and over of the MPO region in 2000 was 2,870,896, of which 118,076, or 4.1%, spoke English either not well or not at all.

km 4 8

miles 2 4

CTPS

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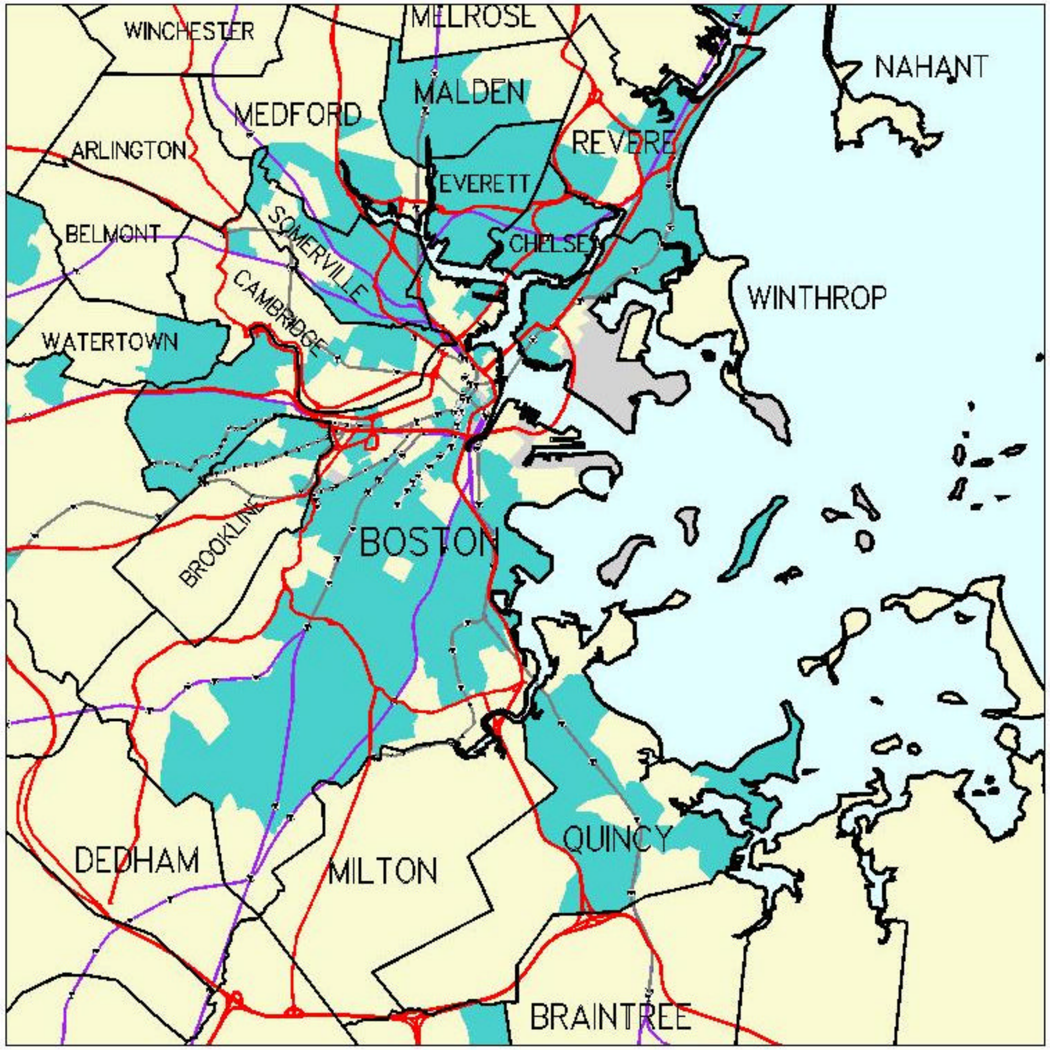

Figure 6-5: Boston MPO

Environmental Justice Measures

Traffic Analysis Zones With Significant

Transit-Dependent Populations in 2000

Legend

- major roads
- Commuter Rail

Zero-Vehicle Households

- 0 To 15.4% Zero Vehicle Households
- More Than 15.4% Zero Vehicle Households

This map symbolizes traffic analysis zones in the 101 town Boston Metropolitan Planning Organization region by their degree of transit dependence. Transit dependence is measured for households with no vehicle available. United States Census data for 2000 indicates that, of 1,[illegible] occupied housing units (households) in the Boston MPO region, [illegible], or 15.4%, had no vehicle available for personal use.

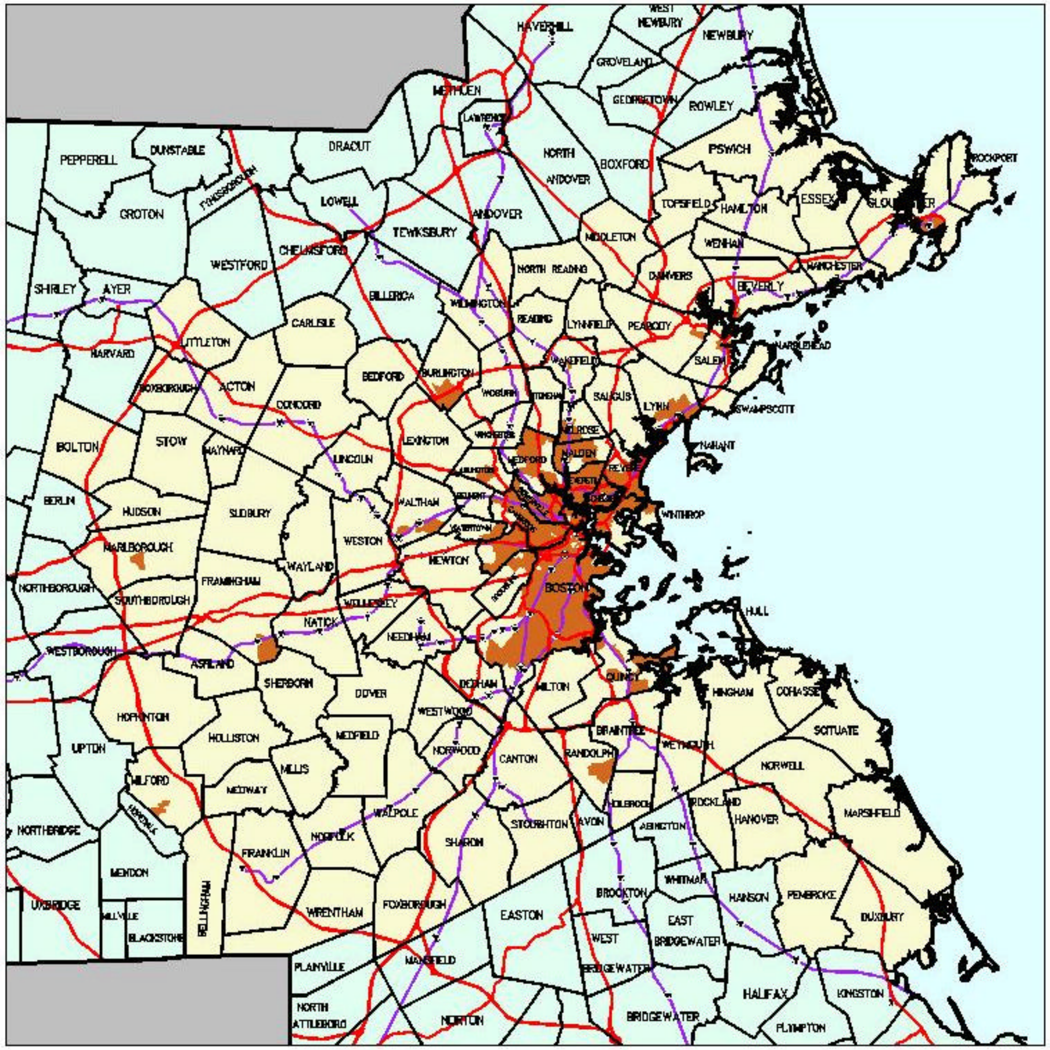

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Figure 6-6: Boston MPO – Urban Core

Environmental Justice Measures

Traffic Analysis Zones With Significant

Transit-Dependent Populations in 2000

Legend

- major roads
- Rapid Transit
- Silver Line Phase 1
- Commuter Rail

Zero-Vehicle Households

- 0 To 15.4% Zero Vehicle Households
- More Than 15.4% Zero Vehicle Households

This map symbolizes traffic analysis zones in the 101 town Boston Metropolitan Planning Organization region by their degree of transit dependence. Transit dependence is measured for households with no vehicle available. United States Census data for 2000 indicates that, of 1,197,393 occupied housing units (households) in the Boston MPO region, 184,502, or 15.4%, had no vehicle available for personal use.

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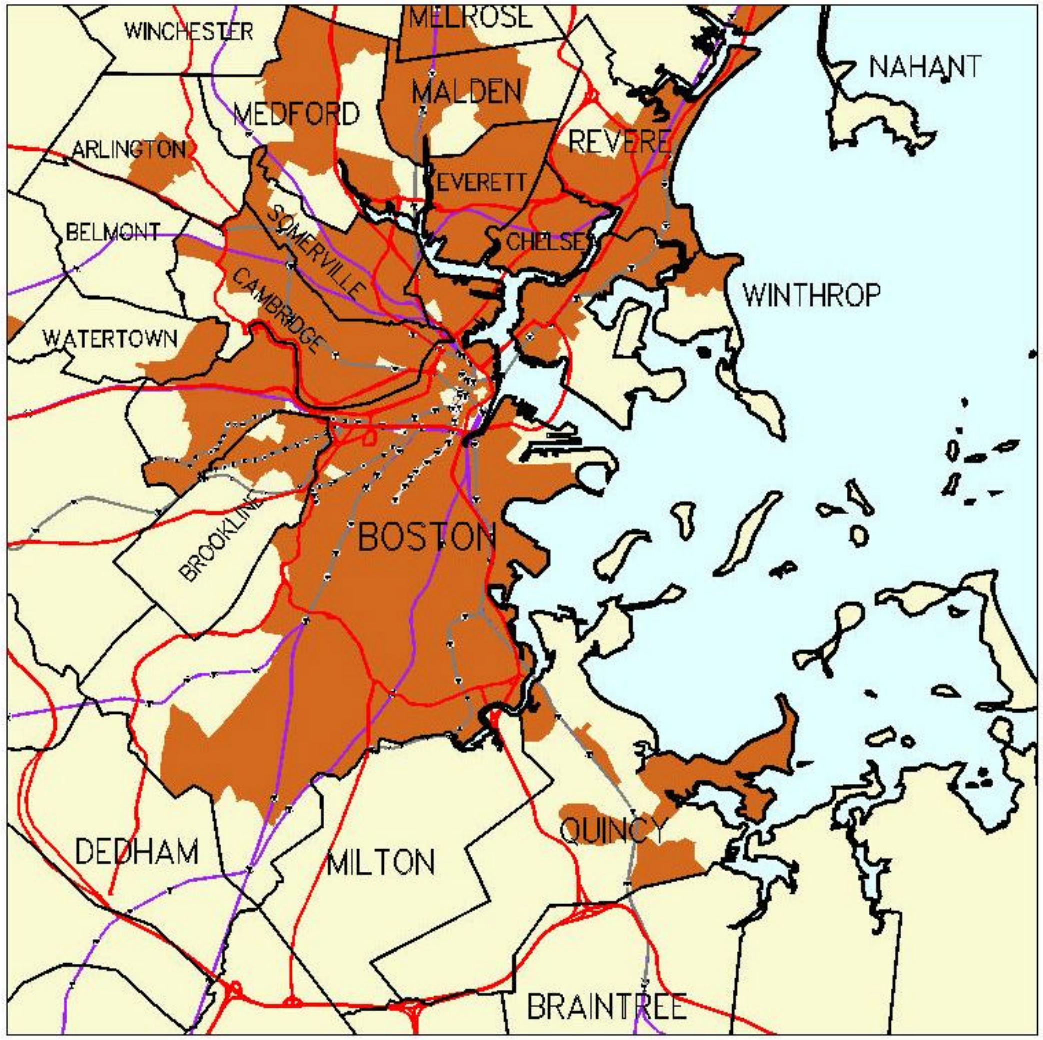


Please See the Boston MPO web-site for high resolution maps of the target populations and target neighborhoods

http://www.ctps.org/bostonmpo/envjust/ej.htm

In addition to the system-wide analysis the MPO sought to undertake a specific community based needs analysis of Environmental Justice communities. The Environmental Justice Committee identified seventeen target neighborhoods (localized groups of TAZs) based on the density of low income and minority populations residing in those TAZs. An accessibility analysis was performed on these target neighborhoods.

The target neighborhoods include:

- Allston/Brighton
- Cambridge
- Chelsea
- Chinatown
- Dorchester
- East Boston
- Framingham
- JP/Mission Hill
- Lynn
- Mattapan
- Quincy
- Revere
- Roxbury
- Salem
- Somerville
- South End
- South Boston

Please refer to Figure 6-7 and 6-8 for the distribution of target neighborhoods within the Boston MPO. Profiles of these were developed with input from the Environmental Justice Committee. These are included in Appendix B.

Concerns and Needs

Community members of the MPO's Environmental Justice Committee provided descriptions of the communities they represent and summaries of their transportation needs and issues of concern. A memo documenting these results is presented in memo titled "Environmental Justice Community Transportation Needs Analysis" which is included in Appendix B. In spite of geographic differences, there were common themes expressed. These summaries provided information on what the populations of concern considered to be benefits and burdens associated with transportation policies and projects that were considered in the Plan. The needs that they expressed focused on a wide range of issues. Analysis was conducted for those that could be assessed through the

regional travel model. Further discussions of how other needs might be addressed will take place in the future.

Common concerns include:

- Mobility
- Language and cultural diversity
- Gentrification
- Construction impacts
- Poor air quality

Common needs include:

- Service improvement to existing transit
- Transportation to decentralized location
- Reduction in traffic congestion

Based on these needs and concerns several indicators of benefits and burdens were developed to address the motor vehicle and transit modes. A memo included in Appendix B titled "Analysis of the MBTA Bus Network Based on Service Measures in the Environmental Justice Section of the Regional Transportation Plan" also helps to identify the needs of the existing transit service by assessing service frequency, vehicle loading, and shelter location for buses and commuter rail.

Performance Measures

The system-wide analysis identified performance measures to address the quantifiable needs of the populations of concern described above.

The performance measures used as indicators of benefits and burdens in this analysis fall into three categories:

- Mobility & Congestion
- Environment
- Access to Needed Services and Jobs

Mobility, and the environment were examined by comparing the target populations with their respective non-target populations within the MPO using predetermined performance measures. These analyses compare populations within a scenario and examined changes between the 2025 no-build and 2025 build scenarios. For a more detailed description of how the analysis was

performed, please refer to the memo on "Proposed Environmental Justice Modeling Methodology v3.0" which is included in Appendix B.

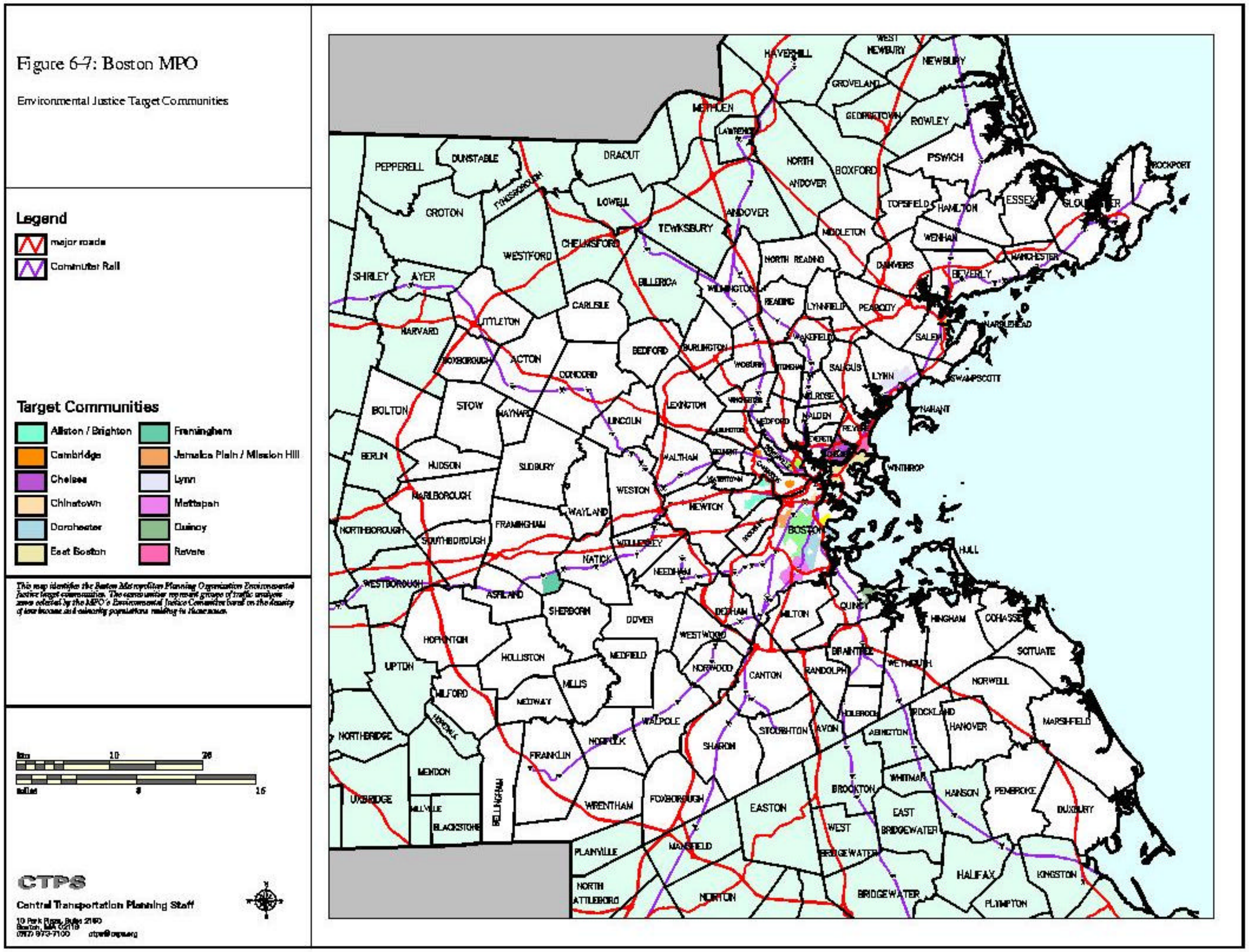


Figure 6-7: Boston MPO

Environmental Justice Target Communities

Figure 6-8: Boston MPO – Urban Core

Environmental Justice Target Communities

Legend

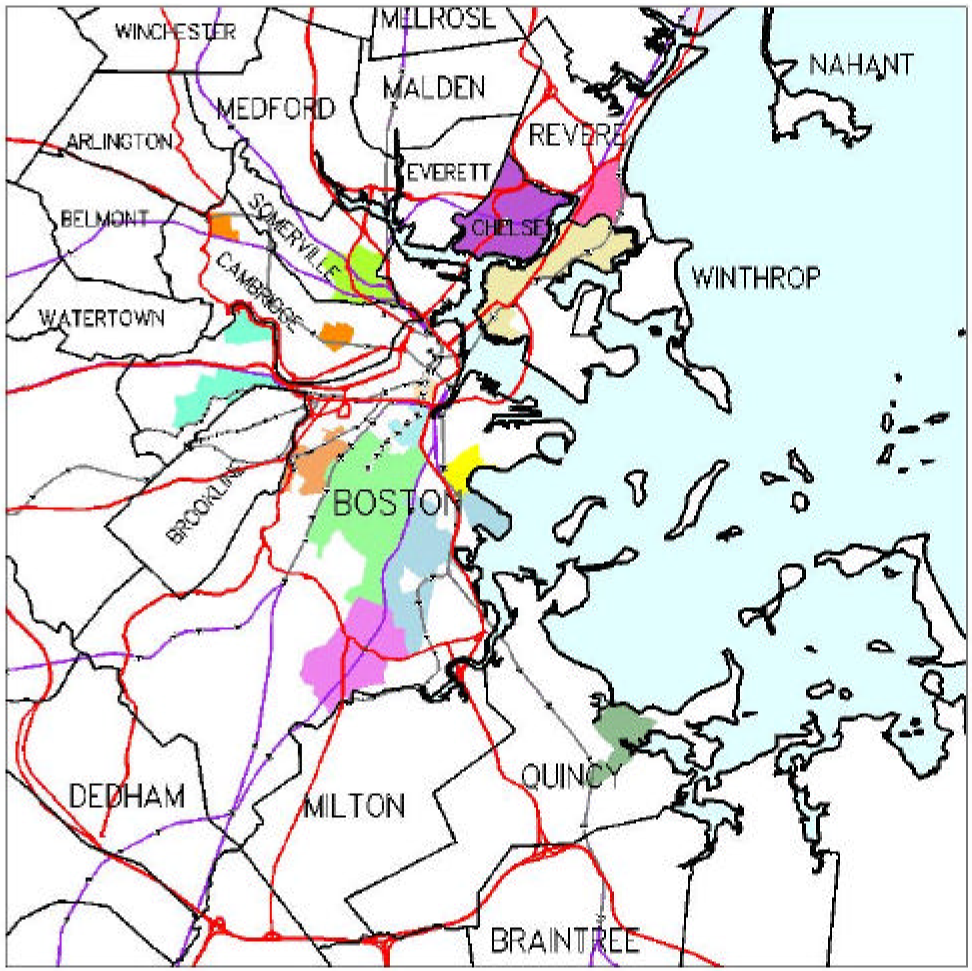
- major roads
- Rapid Transit
- Silver Line Phase 1
- Commuter Rail

Target Communities

Allston / Brighton	Framingham
Cambridge	Jamaica Plain / Mission Hill
Chelsea	Lynn
Chinatown	Mattapan
Dorchester	Quincy
East Boston	Revere

CTPS

Central Transportation Planning Staff



Selected Performance Measures Used in the Analysis

Mobility & Congestion

- Average daily travel time for auto and transit, weighted by trips
- Average daily travel speeds for auto, weighted by trips
- Daily travel time savings
- AM peak period vehicle miles of travel (vmt) in congestion
- Average daily vehicle miles of travel per auto person trips generated at the origin traffic analysis zone as a measure of density of vmt and cut-through traffic

Environmental Concerns

- Density of CO produced in the TAZ

Access to Needed Services & Jobs

In accessing equity, the MPO investigated access from target neighborhoods in terms of travel time to service destinations and employment. The analysis of benefits and burdens of access examined changes between the no-build and build scenarios for all target neighborhoods.

- Access to two-year higher educational facilities weighed by enrollment
- Access to four-year higher educational facilities weighed by enrollment
- Access to extended care facilities weighted by number of beds
- Access to health care facilities
- Access to service employment opportunities
- Access to retail employment opportunities
- Access to manufacturing employment opportunities
- Access to transportation, communication, & public utility employment opportunities

Issues Not Modeled

Other concerns were non-quantifiable and will be subject to future discussions:

- Gentrification issues
- Construction impacts of specific projects on the populations of concern
- Identify to what extent the RTP removes language and cultural obstacles on the transit system

Summary of Recommended Plan Results

The Recommended Plan improves mobility, congestion, accessibility, and environmental concerns relative to the no-build alternative. For all target populations, the mobility analysis showed greater improvements for the transit mode than with auto. Target populations using transit experienced more improvements than the non-targeted populations. There was little difference in the magnitude of improvements experienced by target and non-targeted populations using the auto mode. Please see references to "Preliminary Environmental Justice Results for the 2004-2025 Regional Transportation Plan: Comparison of the No-Build with Build 1 and Build 2 Scenarios" in Appendix B.

Recommended Plan Mobility Analysis Key Points

1. Average daily auto and transit travel times weighted by trips:
   - All target populations and non-target populations experienced decreases in average daily auto travel time relative to the no-build scenario ranging from –1% to -3%.
   - There was no apparent disparity in percent reductions in auto travel time between the different populations within this scenario.
   - All populations experienced decreases in average daily transit travel time relative to the no-build scenario ranging from –1% to -3%.
   - The target populations, namely minority and low-income populations, experienced a higher percent reduction in transit travel time than the non-target populations within this scenario.
   - Please refer to Figure 6-9 and Figure 6-10 for a comparison of results

2. Average daily auto travel speeds weighted by trips
   - All target populations and non-target populations experienced increase in speeds ranging from 2% to 3%.
   - The target populations experienced a greater percent increase than the non-target populations with zero vehicle household population having the largest increase.
   - Please refer to Figure 6-11 for a comparison of results

3. AM peak-period congested vehicle miles of travel (Congestion is defined as a volume to capacity ratio of greater than 0.75 on roadways):
   - All target populations and non-target populations experienced decreases in congested vehicle miles of travel ranging from -4% to –9%.

- The target populations experienced a greater percent reduction than the non-target populations.
- Please refer to Figure 6-12 for a comparison of results

4. Average daily vehicle miles of travel per auto trip generated by the TAZ:
   - All target populations and non-target populations experienced decreases in the ratio of vehicle miles of travel per auto person trip ranging from -4% to –9%.
   - The target populations experienced a greater percent reduction than the non-target populations with the low-income population having the largest reduction.
   - Please refer to Figure 6-13 for a comparison of results

5. Total Travel Time Savings for Highway and Transit Modes:
   - All populations experienced decreases in travel timesaving ranging from 1% to 2%.
   - The non-target populations experienced a slightly greater reduction than the target populations with populations in the suburbs having slightly greater savings then those in the inner core.
   - Please refer to Figure 6-14 for a comparison of results

Recommended Plan Environmental Analysis Key Points

1. Density of CO produced on roadways by automobiles using Mobile 5H emission factors aggregated by roadway class and traffic analysis zone:
   - All populations experienced decreases in carbon monoxide emissions ranging from –1% to –6%.
   - The target populations experienced a greater reduction than the non-target populations with low-income population having the largest reduction.
   - Please refer to Figure 6-15 for a comparison of results

Recommended Plan Accessibility Analysis Key Points

1. Auto Access
   - Education, health care, and employment all showed improvements ranging from 0.5% to 2.5%.
   - Employment opportunities, namely retail and service experienced the greatest improvements.
   - Health care and education both experienced modest gains in services
   - Please refer to Figure 6-16 for a comparison of results

2. Transit Access

- Education, health care, and employment all showed improvements ranging from 2% to 11%.
- Education and health care were much better served by the Build 1 scenario than employment was.
- Please refer to Figure 6-17 for a comparison of results

Summary of Build 2 Results

A second build alternative was also run based on recommendations from the Environmental Justice Committee. This scenario was essentially the same as the first build scenario with the exception that it included the conversion of the Dudley/Boylston section of the existing Silver Line to light rail in place of the Silver Line Phase III project. A partial review of the second alternative was undertaken to understand the benefits and burdens relative to the Build 1 scenario. Build 2 appeared to provide similar benefits as Build 1 in regards to Mobility and Environmental improvements. The accessibility analysis results changed slightly with access to employment showing fewer gains than Build 1 but seeing a slight increase in educational and health care opportunities.

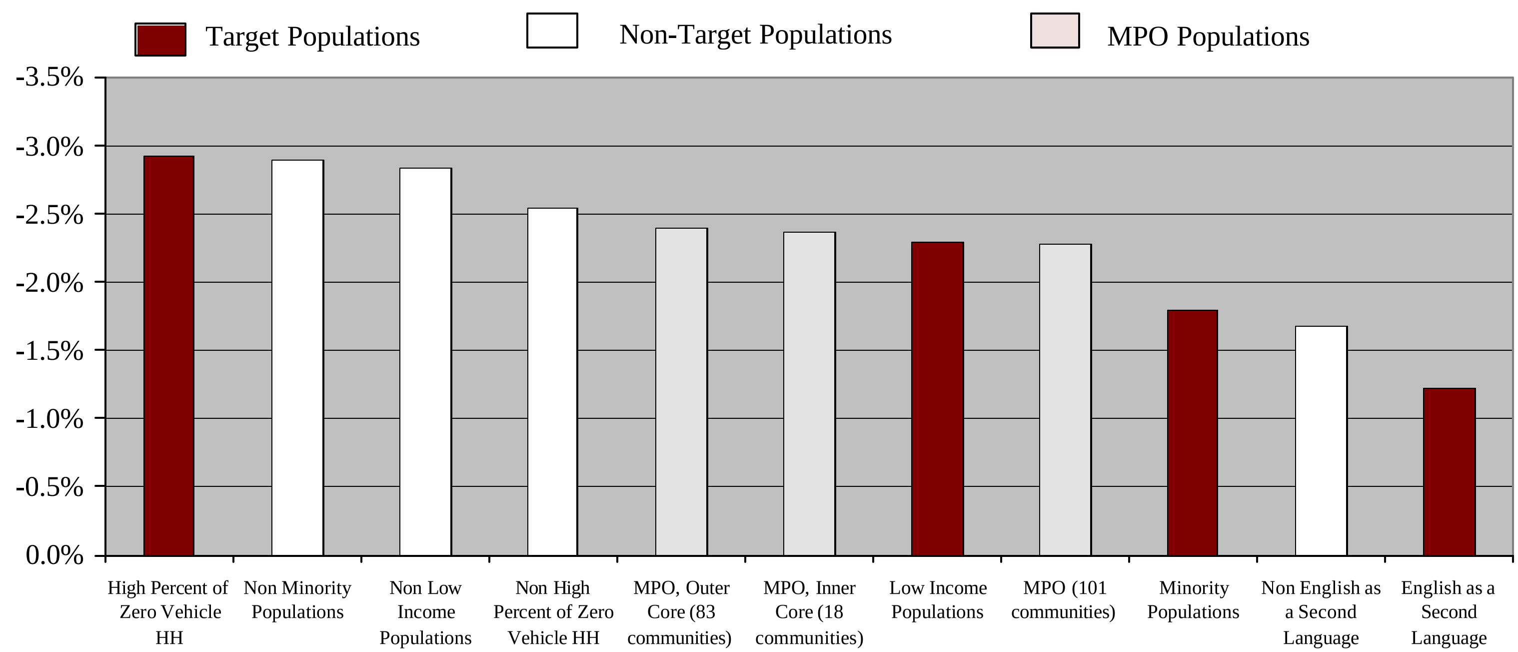
In addition to the environmental justice analysis, this scenario was tested for ridership results with the regional transportation model. The model indicated that the Silver Line project would attract significantly more riders both from the automobile as well as other congested transit services than the Light Rail project. A more detailed discussion of the differences between the two build scenarios is included in Appendix B, in a memo titled, "Ridership Comparison of Silver Line Phase III and Washington Street Light Rail Transit".

Conclusion

The environmental justice analysis shows the Recommended Plan improving mobility, decreasing congestion, reducing carbon monoxide, and providing some access improvements to services and jobs for all populations. Using the results of the mobility analysis, a comparison of the target populations with the non-target populations showed the target populations (using transit) had greater direct benefits than the non-target populations. Most of the benefits to the target population relating to the auto mode were indirect, such as reductions in congestion and air quality, occurring where the target populations live. The accessibility analysis showed some improvements to the target neighborhoods because of improved access to schools and health care via the transit mode and access to jobs via the auto mode.

DRAFT Environmental Justice Mobility Analysis

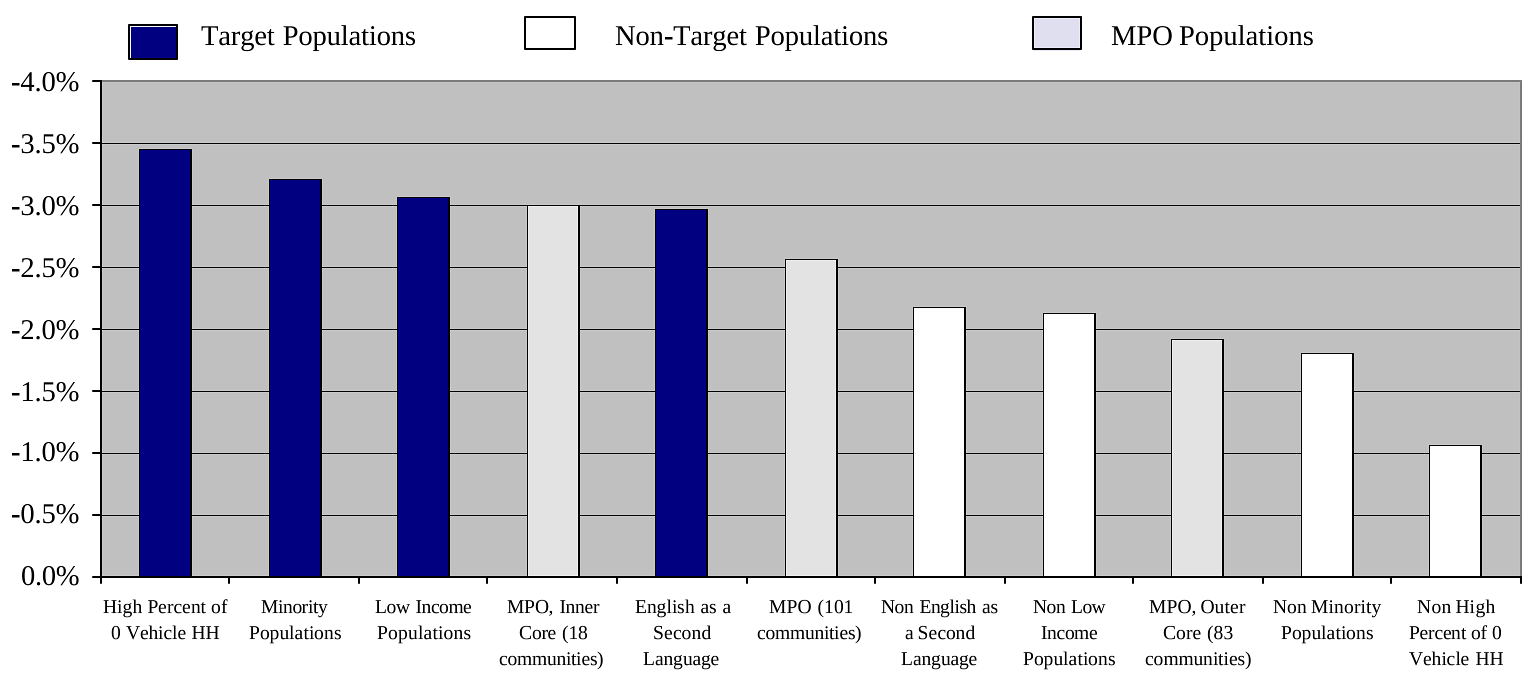
FIGURE 6-9: Reduction in Average Daily Travel Time for Autos
Comparison between 2025 No-build and 2025 Recommended Plan
(Note: Travel Times Weighted by Trips)



DRAFT Environmental Justice Mobility Analysis

FIGURE 6-10: Reduction in Average Daily Travel Time for Transit Comparison between 2025 No-build and 2025 Recommended Plan

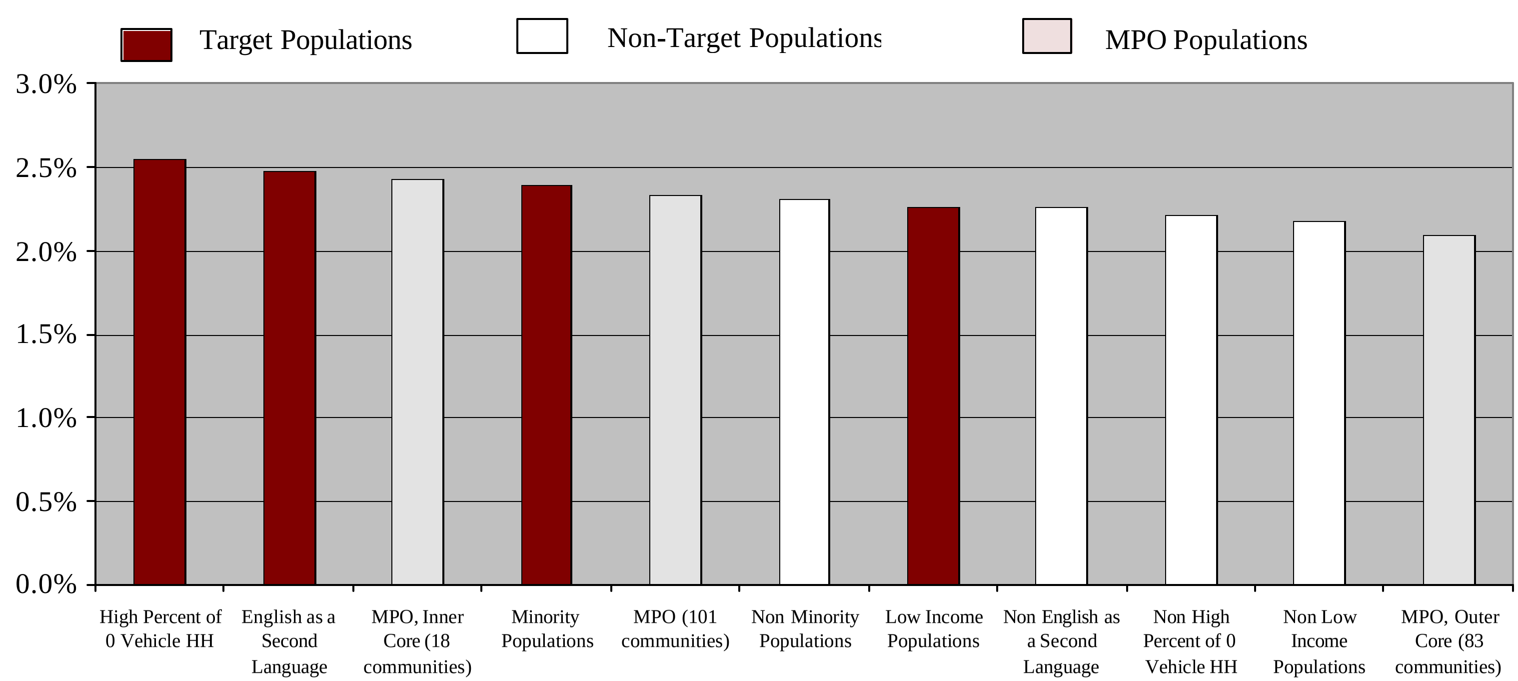
(Note: Travel Times Weighted by Trips)



DRAFT Environmental Justice Mobility Analysis

FIGURE 6-11: Change in Average Daily Travel Speeds for Auto Comparison between 2025 No-build and 2025 Recommended Plan

(Note: Travel Times Weighted by Trips)

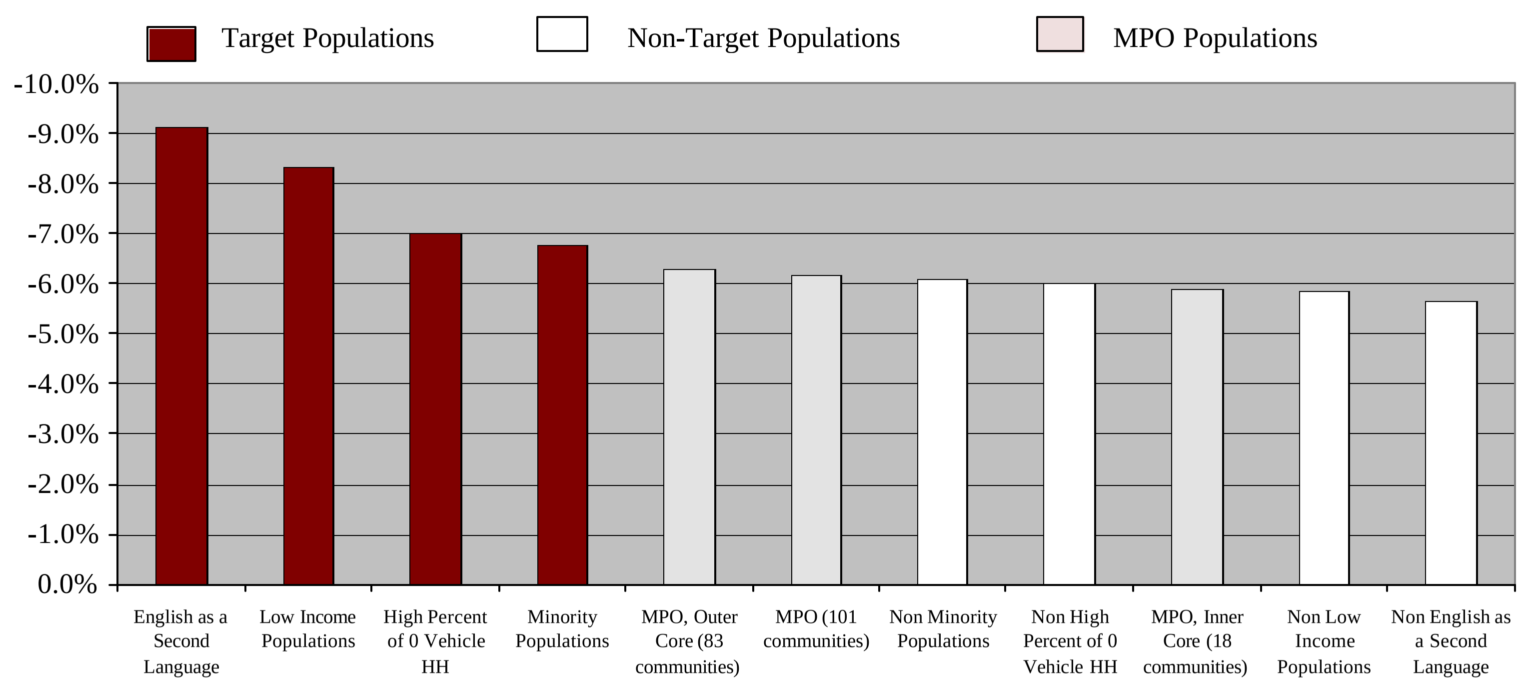


DRAFT Environmental Justice Mobility Analysis

FIGURE 6-12: Reduction in AM Peak Period Congested Vehicle Miles of Travel Comparison between 2025 No-build and 2025 Recommended Plan

(Note: AM peak period is defined as 6:30AM to 9:30AM)

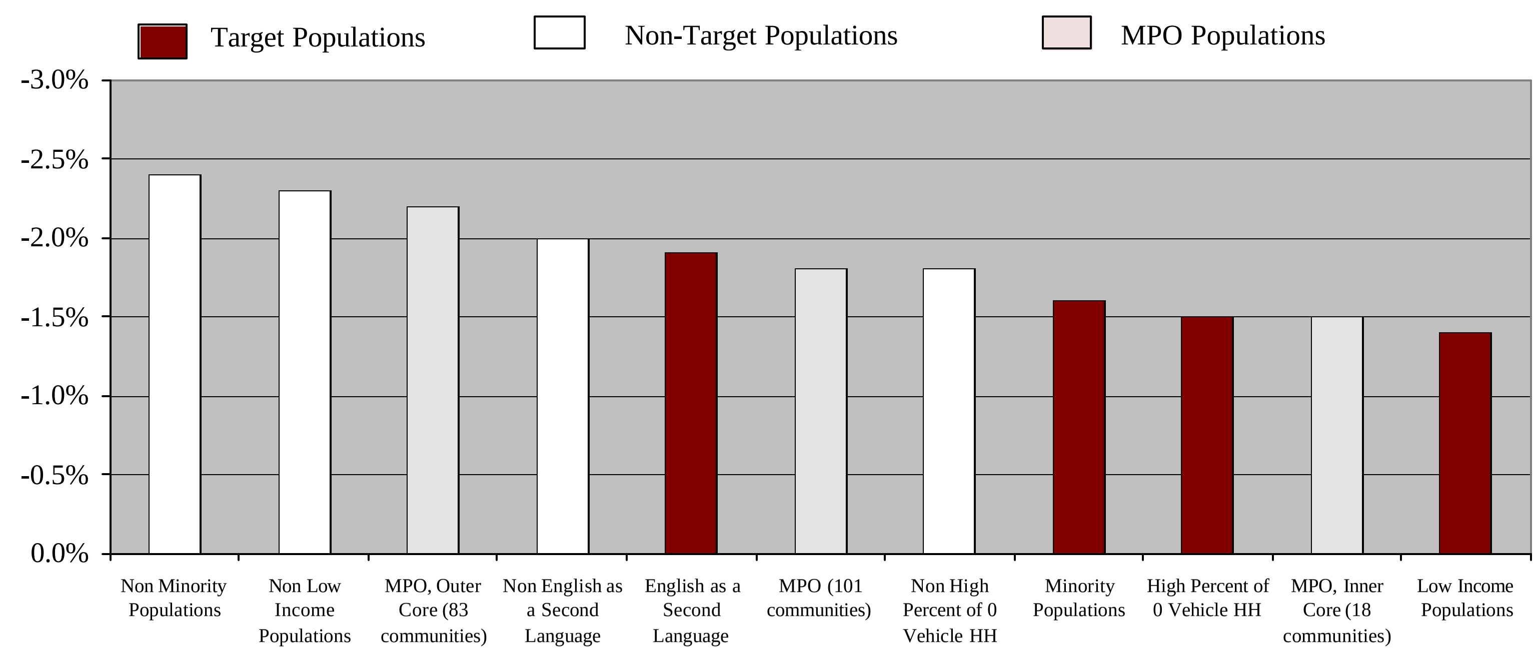
(Note: Congestion is defined as roadway segments having a volume-to-capacity ratio of 0.75 or greater)



DRAFT Environmental Justice Mobility Analysis

FIGURE 6-13: Reduction in Daily Arterial Vehicle Miles of Travel per Auto Trip Generated Comparison between 2025 No-build and 2025 Recomended Plan

(Note: Travel Times Weighted by Trips)

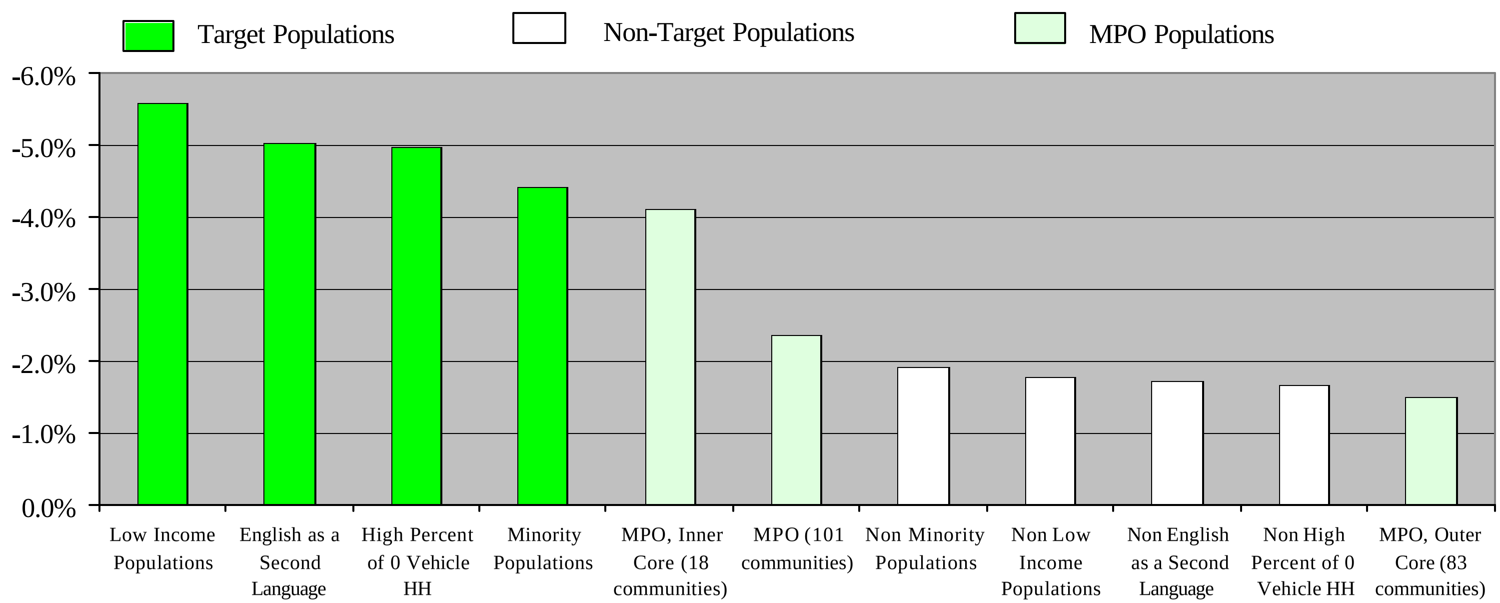


DRAFT Environmental Justice Mobility Analysis

FIGURE 6-14: Changes in Travel Time Savings
Comparison between 2025 No-build and 2025 Recomended Plan
(Note: Composite of Weighted Auto and Transit Times)

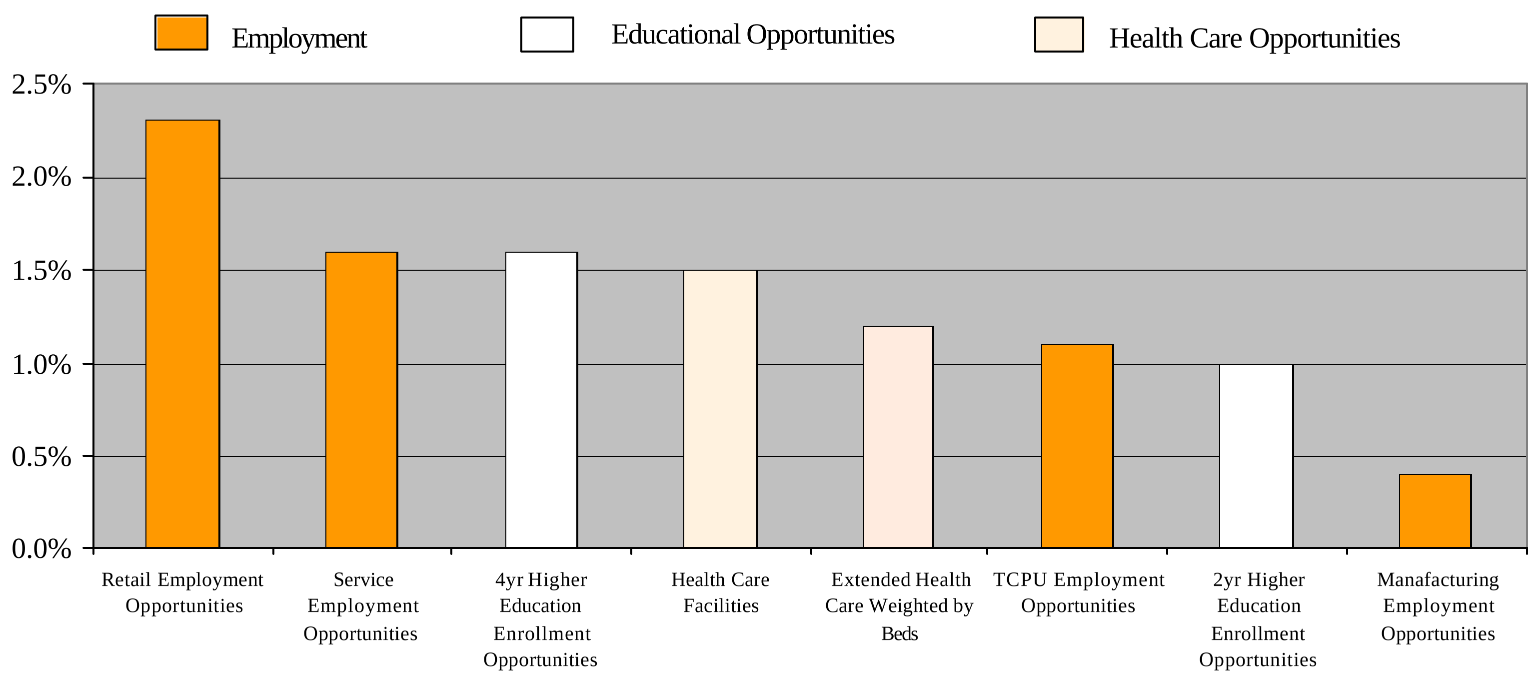
DRAFT Environmental Justice Environmental Analysis

FIGURE 6-15: Changes in Carbon Monoxide Produced by Autos Comparison between 2025 No-build and 2025 Recommended Plan (Using Mobile 5H Emission Factors)



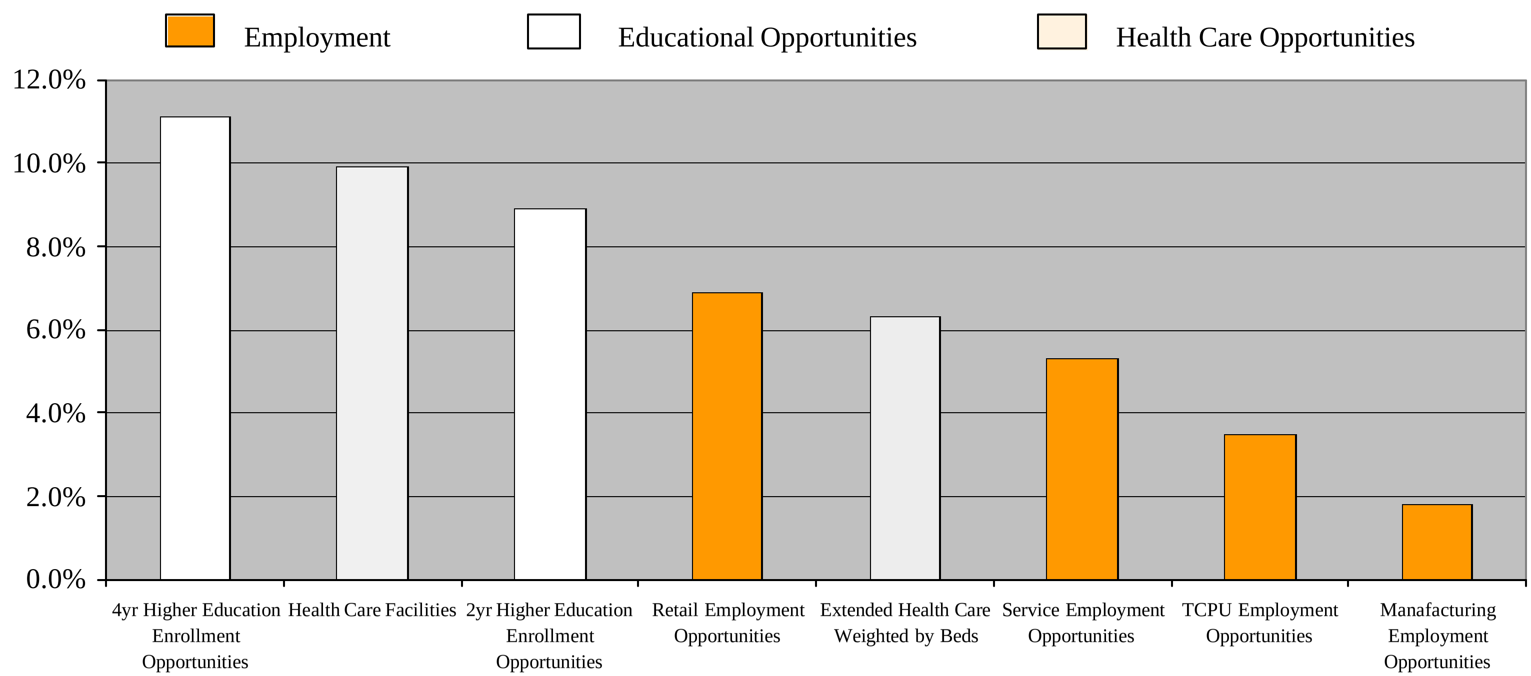
DRAFT Environmental Justice Accessibility Analysis

FIGURE 6-16: Changes in Access to Needed Services and Employment Opportunities by Auto to the Target Neighborhoods Comparison between 2025 No-build and 2025 Recommended Plan



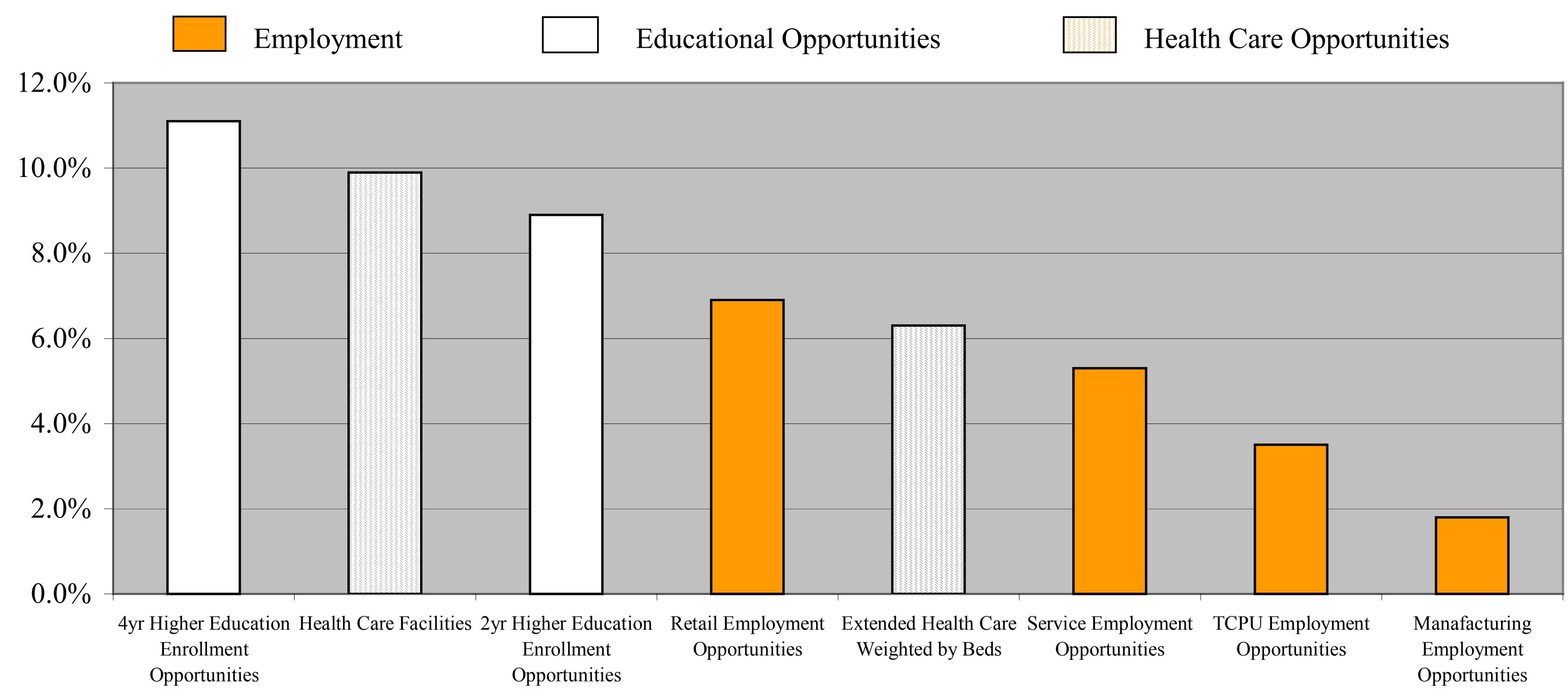
DRAFT Environmental Justice Accessibility Analysis

FIGURE 6-17: Changes in Access to Needed Services and Employment Opportunities by Transit to the Target Neighborhoods Comparison between 2025 No-build and 2025 Recommended Plan



DRAFT Environmental Justice Accessibility Analysis

FIGURE 6-17: Changes in Access to Needed Services and Employment Opportunities by Transit to the Target Neighborhoods Comparison between 2025 No-build and 2025 Recommended Plan



CHAPTER 7: AIR QUALITY CONFORMITY DETERMINATION

Introduction

The 1990 Clean Air Act Amendments (CAAA) require Metropolitan Planning Organizations within nonattainment areas to perform air quality conformity determinations prior to the approval of Transportation Plans and Transportation Improvement Programs. Conformity is a way to ensure that federal funding and approval goes to those transportation activities that are consistent with air quality goals. This section presents information and analyses for the air quality conformity determination for the 2004 Regional Transportation Plan of the Boston Region MPO, as required by Federal Regulations 40 CFR Part 93, and the Massachusetts Conformity Regulations (310 CMR 60.03). This information and analyses include regulatory framework, conformity requirements, planning assumptions, mobile source emissions budgets, and conformity consultation procedures.

Legislative Background

Eastern Massachusetts has been classified as a "serious" ozone nonattainment area. This area includes all of Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Suffolk, and Worcester counties. With this nonattainment classification, the CAAA require the Commonwealth to reduce its emissions of volatile organic compounds (VOCs) and nitrogen oxides (NOx), the two major precursors to ozone formation, to achieve attainment of the ozone standard by 2007 and beyond.

In addition, on April 1, 1996, the communities of Boston, Cambridge, Chelsea, Everett, Malden, Medford, Quincy, Revere, and Somerville were classified as attainment for carbon monoxide (CO). Air quality conformity analysis must still be completed in these communities, as they have a carbon monoxide maintenance plan approved as part of the state implementation plan (SIP). The year 2010 carbon monoxide motor vehicle emission budget established for the Boston CO attainment area with a maintenance plan is 228 tons of carbon monoxide per winter day.

As of April 22, 2002, the community of Waltham was re-designated attainment for CO with an EPA-approved limited maintenance plan. In areas with approved limited maintenance plans, federal actions requiring conformity determinations under the transportation conformity rule are considered to satisfy the "budget test" (as budgets are treated as not constraining in these areas for the length of the initial maintenance period). Any future required "project level" conformity determinations for projects located within this community will continue to use a "hot-spot" analysis to assure that any new transportation projects in this CO attainment area do not cause or contribute to carbon monoxide nonattainment.

On September 6, 2002, DEP submitted to EPA a revision to the Massachusetts SIP that included a revised one-hour ozone attainment demonstration for Eastern Massachusetts. This SIP revision included a 2007 mobile source emission budget for VOC and NOx emissions in the Eastern Massachusetts Non-Attainment Area. This budget was found adequate for conformity purposes by EPA on December 6, 2002 and will be used in this conformity determination.

Conformity Regulations

The CAAA revised the requirements for designated MPOs to perform conformity determinations by ozone non-attainment area for their Transportation Plans and Transportation Improvement Programs (TIPs). Section 176 of the CAAA defines conformity to a State Implementation Plan to mean conformity to the plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of the standards. The Boston Region MPO must certify that all activities outlined in the 2004 Boston Region Transportation Plan:

- will not cause or contribute to any new violation of any standard in any area;
- will not increase the frequency or severity of any existing violation of any standard in any area; and
- will not delay the timely attainment of any standard or any required interim emission reductions or other milestones in any area.

The EPA issued final conformity regulations in the November 24, 1993 Federal Register and Massachusetts DEP issued new conformity regulations effective December 30, 1994. They set forth requirements for determining conformity of Transportation Plans, Transportation Improvement Programs, and individual projects. The federal conformity regulations were amended on August 15, 1997. The requirements of the conformity analysis are summarized below and will be explained in detail in this conformity determination:

Conformity Criteria

- Horizon Years
- Latest planning assumptions
- Latest emission model used
- Timely implementation of transportation control measures (TCMs)
- Conformity in accordance with the consultation procedures and SIP revisions
- Public Participation Procedures
- Financially Constrained Document

Procedures for Determining Regional Transportation Emissions

The Conformity Test

- Consistent with emission budgets set forth in SIP
- Contribute to reductions in CO nonattainment areas

Conformity of this Plan will be showing consistency with the 2007 mobile source emission budget for VOC and NOx in the Eastern Massachusetts Ozone Nonattainment Area and with the CO emission budget for communities of the Boston, Cambridge, Chelsea, Everett, Malden, Medford, Quincy, Revere, and Somerville maintenance area.

Conformity Determination Criteria

This conformity determination has been prepared in accordance with 40 CFR Part 93 - Transportation Conformity Rule Amendments: Flexibility and Streamlining; Final Rule. It shows that 2004 Boston Region Transportation Plan has been prepared following all the guidelines and requirements of the rule.

Horizon Year Requirements

Horizon years for regional model analysis have been established following 40 CFR 93.106(a) of the Federal Conformity Regulations. The years for which emissions are calculated are shown below.

- 1990 - Milestone Year - This year was established as the base year in the SIP for calculation of emission reductions and is not represented in the modeling.
- 2000 - Milestone Year – This year is currently being used as the new base year for calculation of emission reductions of VOCs and NOx.
- 2005 – Analysis Year for CO in Boston area
- 2007 - Milestone Year – Attainment year
- 2010 – Attainment Year for CO in Boston area
- 2015 - Analysis Year
- 2025 - Horizon Year – last forecast year of transportation plan

Latest Planning Assumptions

Section 93.110 of the Federal Conformity Regulations outlines the requirements for the most recent planning assumptions that must be in place at the time of the conformity determination. Assumptions must be derived from the estimates of current and future population, households, employment, travel, and congestion most recently developed by the MPO. Analysis for the 2004 Boston Region Transportation Plan is based on U.S. Census Data and information obtained from

MAPC and MassHighway. The following is a list of the sources of data used for model calibration in this analysis:

- **Population, Households, and Household Size:** Summary File 1 Data for Massachusetts from the 2000 U.S. Census of Population and Housing.

- **Employment:** Town-level total employment from Massachusetts Department of Employment and Training, "Employment and Wages in Massachusetts' Cities and Towns 1991-2000," September 2001. Estimates of employment below town level from factors based upon the Regional Planning Study Site-Level Employment Data Base.

- **Population Forecasts:** Metropolitan Area Planning Council, Population Forecasts, March 2003.

- **Household Forecasts:** Metropolitan Area Planning Council, Population Forecasts, March 2003.

- **Employment Forecasts:** Metropolitan Area Planning Council, Population Forecasts, March 2003..

- **Vehicle Ownership:** Summary File 3 data for Massachusetts from the 2000 U.S. Census of Population and Housing.

- **Traffic Volumes:** Massachusetts Highway Department, "2001 Traffic Volumes for the Commonwealth of Massachusetts" (contains data from 1992 – 2001), June, 2002. Additional traffic counts taken by MassHighway and the Central Transportation planning Staff.

- **Project-Level Data:** Obtained from the responsible implementing agency.

Transit Operating Policy Assumptions

Transit service assumptions used in ridership modeling of the Plan were based on 1993/1994/1995 MBTA service. The model calibration was performed using the following:

- MBTA's Ridership and Service Statistics, Eighth Edition, 2002
- The Central Artery/Third Harbor Tunnel Regionl Transit Mitigation Program prepared by Vanesse Hangen Brusslin for the MBTA, September 1991.

The operating policies and assumed transit ridership have not changed since the conformity determination prepared for the 2000-2025 Regional Transportation Plan Update.

Emission Inventory Assumptions

For this regional transportation plan, conformity is determined against the Massachusetts State Implementation Plan (SIP) mobile source emission budgets submitted in September 2002 (approved in December 2002) for VOC and NOx. The VOC mobile source emission budget for 2007 for the Massachusetts Eastern Nonattainment Area has been set at 86.7 tons per summer day and the 2007 mobile source budget for NOx is 226.363 tons per summer day.

The Boston Region MPO VOC and NOx emissions are included with the following MPOs to show conformity with the SIP in the Eastern Massachusetts Ozone Nonattainment Area:

- Cape Cod MPO
- Central Massachusetts MPO
- Merrimack Valley MPO
- Montachusett Region MPO
- Northern Middlesex MPO
- Old Colony MPO
- Southeastern Region MPO
- Martha's Vineyard Commission*
- Nantucket Planning and Economical Development Commission*

* These regions are considered to be MPOs for planning purposes.

CO emission projections have been set for the nine cities in the Boston area classified to attainment. An emission attainment inventory for CO of 501.53 tons per winter day was established for all sources of CO emissions (mobile, industrial, and all other sources of CO) for the redesignation year 1993. Of that 501.53 tons, 305.43 tons per winter day were allocated for mobile sources. In addition to the attainment year inventory, EPA required that emission projections for every five years through 2010 be developed for all sources to ensure that the combination of all CO emissions will not exceed the total 501.53 tons per winter day in the future. The mobile source emission projections have been set as shown below. Emissions from the nine towns in the Boston area can not exceed the amount in the last year of the maintenance plan (2010).

- 226.0 tons per winter day for 2000
- 217.53 tons per winter day for 2005
- 228.33 tons per winter day for 2010

MassHighway's Bureau of Transportation Planning and Development, on behalf of the Executive Office of Transportation and Construction (EOTC), estimated the results for all the MPOs in the Eastern Massachusetts Ozone Nonattainment Area using a statewide travel demand model (the Boston MPO model results were substituted as the latest planning assumptions for the conformity analysis). The air quality analysis has been finalized for all of the MPOs and the EOTC has made the final conformity determination for this ozone nonattainment area.

Latest Emission Model

Emission factors used for calculating emission changes were determined using MOBILE 6.2, the model used by DEP in determining the mobile source budget. Emission factors for motor vehicles are specific to each model year, pollutant type, temperature, and travel speed. MOBILE 6.2 requires a wide range of input parameters including inspection and maintenance program information and other data such as anti-tampering rates, hot/cold start mix, emission failure rates, vehicle fleet mix, fleet age distribution, etc.

The input variables used in this conformity determination were received from DEP. The inputs used for the 2000 base case network were the same as those used in determining the latest Emissions Inventory for the Commonwealth of Massachusetts. The inputs used for the years 2007 through 2025 were also received from DEP and include information on programs that were submitted to EPA in 1993, 1994, 1997, 1998 and 1999 as the control strategy for the Commonwealth to obtain ambient air quality standards for 1999 and beyond.

Timely Implementation of Transportation Control Measures

Transportation control measures (TCMs) have been required in the SIP in revisions submitted to EPA in 1979 and 1982 and those submitted as part of the Central Artery project. Those TCMs included in the 1979 and 1982 submission have been accomplished through construction or through implementation of ongoing programs. The only exceptions are the bus immersion heater program, the Newton Rider bus service, the private bus insurance discount concept, and the pedestrian malls in Lynn, Cambridge, and Needham. These TCMs have been substituted with other services. A list of the TCMs is provided in Appendix I. These projects have all been included in past Boston Region MPO Transportation Plans and TIPs.

TCMs that were submitted as a SIP commitment as part of the Central Artery mitigation are also included in Appendix I. The status of these projects has been updated using the Administrative Consent Order (ACO) signed by EOTC and the Executive Office of Environmental Affairs (EOEA) on September 1, 2000 and the Project Update and Schedule submitted by the MBTA to DEP in July 2002. All of the

projects have been included in the Transportation Plan as recommended projects. A list of those projects include:

- Southeast Expressway High Occupancy Vehicle Lane
- HOV Lane on I-93 Mystic Avenue
- 20,000 New Park and Ride Spaces
- Ipswich Commuter Rail Extension to Newburyport
- Old Colony Commuter Rail Extension
- Framingham Commuter Rail Extension to Worcester
- Green Line Extension to Medford Hillside
- Red Line/Blue Line Connector
- South Boston Piers Transitway

The ACO reconciles and adjusts dates of completion for all projects required as mitigation for the Central Artery that have not been completed to date. This conformity determination includes all projects that are part of the ACO. The two transit TCM SIP commitment projects that have not been completed include the Greenbush Line of the Old Colony Commuter Rail Service and the Arborway Restoration project. Substitute projects have been submitted to DEP for these projects and are included in the Transportation Plan.

Consultation Procedures

The final conformity regulations require that the MPO must make a conformity determination according to consultation procedures set out in the federal and state regulations and it must also follow public involvement procedures established by the MPO under federal metropolitan transportation planning regulations.

The consultation requirements of both the state and federal regulations require that the Boston Region MPO, EOTC/MassHighway, Mass. DEP, EPA - Region 1 and FHWA - Region 1 consult on the following issues:

- Selection of regional emissions analysis models including model development and assessing project design factors for modeling.
- Selection of inputs to the most recent EPA-approved emissions factor model.
- Selection of CO hotspot modeling procedures, as necessary.
- Identification of regionally significant projects to be included in the regional emissions analysis.
- Identification of projects which have changed in design and scope.
- Identification of exempt projects.
- Identification of exempt projects that should be treated as non-exempt because of adverse air quality impacts.
- Identification of the latest planning assumptions and determination of consistency with SIP assumptions.

These issues have all been addressed through consultation of the agencies listed above.

Public Participation Procedures

Title 23 CFR Sections 450.324 and 40 CFR 90.105(e) require that the development of the Plan, TIP, and related certification documents provide an adequate opportunity for public review and comment.

Section 450.316(b) establishes the outline for MPO public participation programs. The Boston MPO's public participation program was formally adopted in July 1994. The development and adoption of this program conforms to the requirements of the section. It guarantees public access to the 2004 Regional Transportation Plan and all supporting documentation, provides for public notification of the availability of the Transportation Plan and the public's right to review the document and comment thereon, and provides a 30-day public review and comment period prior to the adoption of the Transportation Plan and related certification documents by the MPO.

On July 27, 2003 a public notice was advertised in the Boston Globe informing the public of its right to comment on the document. On _______, the Boston Region MPO voted to approve the 2004 Regional Transportation Plan and its conformity determination. This allowed ample opportunity for public comment and MPO review of the draft document. These procedures comply with the associated federal requirements.

Financial Consistency

Title 23 CFR Section 450.324 and 40 CFR 93.108 require the 2004 Boston Region Transportation Plan to "be financially constrained by year and include a financial plan that demonstrates which projects can be implemented using current revenue sources and which projects are to be implemented using proposed revenue sources."

The 2004 Boston Region Transportation Plan and its latest conformity determination is financially constrained to projections of federal and state resources reasonably expected to be available during the appropriate time-frame. Projections of federal resources are based upon the estimated apportionment of the federal authorizations contained in SAFETEA, the six-year transportation reauthorization bill recently filed by the Administration, as allocated to the region by the state or as allocated among the various MPOs according to federal formulas or MPO agreement. Projections of state resources are based upon the allocations contained in the current Transportation Bond Bill and historic trends. Therefore, the 2004 Boston Region Transportation Plan substantially complies with federal requirements relating to financial planning.

Procedures for Determining Regional Transportation Emissions
The federal conformity regulations set forth specific requirements for determining transportation emissions. A summary of these requirements and the procedures used for this plan are summarized below:

Demographic, Employment and Transportation Demand

Specific sources of population, households, employment and traffic information used in the Transportation Plan have been listed above. Chapter 5 of the Plan outlines specific project recommendations that are set forth in the Plan for the Boston Region through the year 2025.

Only regionally significant projects are required to be included in the travel demand modeling efforts. The final federal conformity regulations define regionally significant as follows:

> ***Regionally significant:*** a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sport complexes, etc., or transportation terminals as well as most terminals themselves) and would be included in the modeling of a metropolitan area's transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel. A listing of projects exempt from any air quality analysis is included in Appendix I.

In addition, specific projects have been exempt from regional modeling emissions analysis. The categories of projects include:

- Intersection channelization projects,
- Intersection signalization projects at individual intersections,
- Interchange reconfiguration projects,
- Changes in vertical and horizontal alignment,
- Truck size and weight inspection stations, and
- Bus terminals and transfer points.

Previous conformity amendments now allow traffic signal synchronization projects to be exempt from conformity determinations prior to their funding, approval or implementation. However, once they are implemented, they must be included in conformity determinations for future plans and TIPs.

The Build Network is composed of projects proposed in the approved Transportation Improvement Programs, the 2004 Transportation Plan, and projects in the MBTA capital budget. A listing of the projects that meet these criteria and are included as part of the Transportation Plan Action networks is shown in Table 7-1.

In addition to emissions calculated from the network model, a separate analysis was performed off-model to determine emissions from commuter rail, commuter boat, and the MBTA bus program.

Table 7-1
2004 Transportation Plan: Future Needs Analysis Build Networks

Projects	**2007 Build**	**2015 Build**	**2025 Build**
Crosby Drive (Bedford)	X	X	X
Middlesex Turnpike (Bedford & Burlington)	X	X	X
Rte. 128 Capacity Improvements (Beverly to Peabody)			X
East Boston Haul Road/Chelsea Truck Route (Boston)		X	X
Arborway Restoration (Boston)	X	X	X
100 Additional Buses to Improve Service on Existing Rtes		X	X
Red Line/Blue Line Connector (Boston)		X	X
Fairmount Line Improvements (Boston)	X	X	X
Route 1A/Boardman Street Grade Separation (Boston)			X
Russia Wharf Ferry Terminal (Boston)		X	X
Rutherford Avenue (Boston)			X
Silver Line Phase 3 (50/50) (Boston)		X	X
Old Colony/Greenbush Commuter Rail (Boston to Scituate)		X	X
Double Stack Initiative (Boston to Newton)		X	X
Green Line to West Medford (Boston, Medford & Somerville)		X	X
Urban Ring Phases I & 2 (Compact Communities)			X
I-93/I-95 Interchange (Canton)		X	X
I-93 (NB)/Dedham Street Ramp (Canton)		X	X
Concord Rotary (Concord)			X
Route 2/Crosby's Corner (Concord and Lincoln)	X	X	X
Route 1/114 Corridor Improvements (Danvers & Peabody)			X
Telecom City Boulevard (Everett, Malden & Medford)	X	X	X
Revere Beach Parkway (Everett & Medford)			X
Route 126/135 Grade Separation (Framingham)			X
Rte. 9/Rte. 126 Interchange (Framingham)		X	X

Table 7-1 (cont.)

Projects	2007 Build	2015 Build	2025 Build
Double Stack Initiative (Framingham to Worcester)		X	X
Route 53 (Hanover)			X
Route 53/228 (Hingham and Norwell)	X	X	X
Rte. 128 Capacity Improvements (Lynnfield to Reading)			X
Route 1 Improvements (Malden & Revere)			X
I-495/I-290/Route 85 Interchange (Marlborough)			X
Double Stack Initiative (Natick & Wellesley)		X	X
Needham Street/Highland Avenue (Newton & Needham)			X
Burgin Parkway (Quincy)			X
Quincy Center Concourse, Phase 2 (Quincy)		X	X
I-93/I-95 Initiative (Reading & Woburn)			X
Mahoney Circle Grade Separation (Revere)		X	X
Route 1/Route 16 Interchange (Revere)		X	X
Route 1A/Route 16 Connection (Revere)			X
North Shore Transit Improvements (Revere to Salem Corridor)			X
Boston Street (Salem)		X	X
Bridge Street (Salem)		X	X
Assembly Square Orange Line Station (Somerville)		X	X
I-93/Mystic Avenue Interchange (Somerville)			X
Naval Air Station Access Improvements (Weymouth)		X	X
Route 18 (Weymouth)	X	X	X
Route 3 South Additional Lanes (Weymouth to Duxbury)			X
I-93/Ballardvale Street Interchange (Wilmington)			X
I-93/Route 129 Interchange (Wilmington)		X	X
New Boston Street Bridge (Woburn)			X

Changes in Project Design Since the Last Conformity Determination Analysis

The Commonwealth requires that any changes in project design from the previous conformity determination for the region be identified. The last conformity determination was performed on the 2000-2025 Transportation Plan Update. Changes which have occurred since this last conformity determination are as follows:

- Conformity must be performed using the newly submitted 2007 mobile source emission budget.
- Conformity must be performed using new emission factors submitted by DEP, which reflect the latest assumptions (i.e., progress of the I/M program, etc.).
- The mix of projects included in the Transportation Plan has changed since the last conformity determination.

Model Specific Information

40 CFR Part 93.111 of the federal regulations outlines requirements to be used in the network-based transportation demand models. These requirements include modeling methods and functional relationships to be used in accordance with acceptable professional practice and reasonable for purposes of emission estimation. The Boston Region MPO has used the methods described in the conformity regulations in the analysis of this Transportation Plan.

Highway Performance Monitoring System Adjustments

As stated in guidance by EPA, all areas of serious ozone and carbon monoxide nonattainment must use the Federal Highway Administration's Highway Performance Monitoring System (HPMS) to track daily vehicle miles of travel (VMT) prior to attainment to ensure that the state is on line with commitments made in reaching attainment of the ambient air quality standards by the required attainment dates. MassHighway provides HPMS information to DEP. DEP used this information in setting mobile source budgets for VOCs, NOx, and CO in all SIP revisions prior to 1997. DEP has since revised its VOC and NOx budgets using transportation demand model runs. However, the models must still be compared to HPMS data since HPMS is at present the accepted tracking procedure as outlined in the regulations.

The conformity regulations require that all model based VMT be compared with the HPMS VMT to ensure that the region is in line with VMT and emission projections made by DEP. An adjustment factor has been developed which compares the 2000 HPMS VMT to the 2000 transportation model VMT. This adjustment factor is then applied to all modeled VOC and NOx emissions for years 2007 through 2025 to ensure consistency with EPA accepted procedures.

$$\frac{\text{2000 HPMS VMT}}{\text{2000 Modeled VMT}} = \begin{array}{c}\text{Adjustment Factor} \\ \text{for VOC and NOx}\end{array}$$

HPMS adjustment factors are now calculated through the statewide travel demand model on a county-by-county basis (due to the format of HPMS data). These factors are applied to model output of future scenarios, and occasionally change as base

year models are updated or improved. The latest HPMS factors for the Eastern Massachusetts Ozone Nonattainment Area are shown in Table 7-2:

Table 7-2
HPMS Adjustment Factors

COUNTY	2000 HPMS VMT (miles)	2000 Travel Demand Model VMT (miles)	HPMS/Model Conversion Factor
Barnstable	6,204,000	5,303,767	1.170
Bristol	11,827,000	12,503,767	0.946
Dukes	219,000	173,899	1.259
Essex	16,165,000	18,346,012	0.881
Middlesex	31,083,000	40,642,001	0.765
Nantucket	108,000	59,786	1.806
Norfolk	17,425,000	18,449,589	0.944
Plymouth	9,734,000	11,306,093	0.861
Suffolk	7,541,000	11,011,826	0.685
Worcester	19,896,000	23,694,488	0.840
Eastern MA	120,202,000	141,491,229	0.850

The Conformity Test

Consistency with emission budgets set forth in SIP

The Boston Region MPO has conducted an air quality analysis of the 2004 Boston Region Transportation Plan. The purpose of the analysis is to evaluate the plan's air quality impacts on the State Implementation Plan (SIP). The analysis evaluates the change in ozone precursor (VOCs and NOx) emissions and carbon monoxide emissions due to implementation of the 2004 Transportation Plan. The modeling procedures and assumptions used in this air quality analysis follow the EPA's final conformity regulations issued on August 15, 1997. They are also consistent with procedures used by the Massachusetts Department of Environmental Protection to develop Massachusetts' 1990 Base Year Emission Inventory, 1996 Reasonable Further Progress Plan, the Post-1996 Reasonable Further Progress Plan, 1996 Rate of Progress Report, and the Ozone Attainment Demonstration for the SIP. All consultation procedures were followed to ensure that a complete analysis of the 2004 Boston Region Transportation Plan was performed with consistency with the SIP.

The primary test to show conformity with the SIP is to show that the Air Quality Conformity of the 2004 Transportation Plan is consistent with the emission budgets set forth in the SIP. The Massachusetts Reasonable Further Progress Plan (RFP) was deemed complete by EPA on June 5, 1997. EPA determined that the 15% RFP SIP submittal contained an adequate mobile source emissions budget to conduct conformity determinations using the conformity criteria. In addition, the 2007 mobile source emission budget for Eastern Massachusetts was found adequate for conformity purposes by EPA on December 6, 2002.

On behalf of the Executive Office of Transportation and Construction, the Bureau of Transportation Planning and Development estimated the emissions for VOC and NOx for all areas and all MPOs (emissions for the Boston Region were also estimated by MPO staff and were included in the final totals). The VOC mobile source emission budget for 2007 for the Eastern Massachusetts Nonattainment Area has been set at 86.7 tons per summer day and the 2007 mobile source budget for NOx is 226.363 tons per summer day. As shown in Tables 7-3 and 7-4, the results of the air quality analysis demonstrate that the VOC and NOx emissions from all Build scenarios are less than the VOC and NOx emissions budgets for the Eastern Massachusetts Nonattainment Area. The CO mobile source attainment inventory for 1993 for the nine cities in the Boston area recently reclassified as attainment is 305.43 tons per winter day. The projections provided for mobile sources for the Boston area are 226 tons per winter day for 2000, 217.53 tons per winter day for 2005, and 228.33 tons per winter day for 2010. The total tons per winter day of CO emissions for the nine cities in the Boston maintenance area are shown in Table 7-5. The CO emissions are less than the CO emission budget.

TABLE 7-3
VOC Emissions Estimates for the Eastern Massachusetts Ozone Nonattainment Area
(all emissions in tons per summer day)

Year	Boston Build Emissions	Eastern MA Action Emissions	Budget	Difference (Action – Budget)
2000	n/a	166.545	n/a	n/a
2007			86.700	
2015			86.700	
2025			86.700	

TABLE 7-4
NOx Emissions Estimates for the Eastern Massachusetts Ozone Nonattainment Area
(all emissions in tons per summer day)

Year	Boston Build Emissions	Eastern MA Action Emissions	Budget	Difference (Action – Budget)
2000	n/a	287.877	n/a	n/a
2007			226.363	
2015			226.363	
2025			226.363	

TABLE 7-5
Winter Carbon Monoxide Emissions Estimates for the CO Maintenance Area for the Nine Cities in the Boston Area (all emissions in tons per winter day)

Year	Boston Build Emissions	Budget	Difference (Action – Budget)
1993	305.43	n/a	n/a
2000		226.00	
2005		217.53	
2010		228.33	
2015		228.33	
2025		228.33	

Note: The final emission estimates were not yet available at the time of this printing. The final emission estimates will be available in subsequent versions of this draft Plan, and at the Boston MPO meeting scheduled to endorse this document. Based on previous emission estimates, it is anticipated that the updated action emissions will fall within the emissions budget.

CONCLUSION

The Clean Air Act Amendments of 1990 established new requirements for transportation plans, programs, and projects. EPA published a final rule in the November 24, 1993 Federal Register which was last amended on August 15, 1997 providing procedures to be followed by the United States Department of Transportation in determining conformity of transportation plans, programs, and projects with the SIP. Eastern Massachusetts has been designated as a Serious ozone nonattainment area. Federal conformity regulations require that transportation plans, programs, and projects evaluate their impact on nonattainment areas.

The Boston Region MPO has conducted an air quality analysis of the 2004 Boston Region Transportation Plan and its latest conformity determination. The purpose of the analysis is to evaluate the Plan's air quality impacts on the SIP. The analysis evaluates the change in ozone precursor emissions (VOCs and NOx) and CO emissions due to the implementation of the 2004 Boston Region Transportation Plan. The modeling procedures and assumptions used in this air quality analysis follow EPA's and the Commonwealth's guidance and are consistent with all present and past procedures used by the Massachusetts DEP to develop and amend the SIP.

The EOTC has found the emission levels from all areas and all MPOs in Eastern Massachusetts – including emissions from the 2004 Boston Region Transportation Plan – to be in conformance with the SIP according to conformity criteria. Specifically, the following conditions are met:

- The VOC emissions for the Build scenarios are less than the 2007 VOC mobile source emission budget for analysis years 2007 through 2025.
- The NOx emissions for the Build scenarios are less than the 2007 NOx mobile source emission budget for analysis years 2007 through 2025.
- The CO emissions for the Build scenarios are less than the 1993 CO mobile source emission budget and projections for analysis years 2005 through 2025 for the nine cities in the Boston area CO maintenance area.

In accordance with Section 176(c)(4) of the Clean Air Act as amended in 1990, the MPO for the Boston Region has completed its review and hereby certifies that the 2004 Boston Region Transportation Plan and its latest conformity determination conditionally conforms with 40 CFR Part 93, and 310 CMR 60.03, and is consistent with the air quality goals in the Massachusetts State Implementation Plan.

APPENDIX A

CMS Strategy in the Boston Region MPO

MEMORANDUM

TO: **CMS Project Files** **June 9, 2003**

FROM: **Lourenço Dantas**
Principal Transportation Planner

Efi Pagitsas
Manager, Traffic Analysis and Design

RE: **Regional Transportation Plan Update: CMS Strategy and Project Recommendations for MPO Roadways**

The Boston MPO's roadways need to be in excellent operational condition in order to allow for safe and efficient travel for commuters, commercial vehicle operators, and visitors. In addition to these primary benefits, positive impacts of safer and less congested roadway travel include improved air quality, enhanced economic activity, and reduced cut-through traffic on local roads.

This document describes the CMS perspective on attaining these goals, based on the experience of the CMS data collection and planning studies. The following general recommendations are made for each of the three roadway systems:

- *Freeways and Highways*
    - Address travel-lane continuity inconsistencies;
    - Continue and expand the existing HOV lane system;
    - Upgrade substandard interchanges;
    - Implement incident and traffic management strategies using ITS.
- *Arterials (Boston and Inner Suburbs)*
    - Implement operational and traffic management strategies;
    - Strictly enforce on-street parking regulations.
- *Arterials (Outer Suburbs)*
    - Improve downtown parking management and traffic circulation;
    - Improve traffic signal coordination;
    - Create left-turn bypass opportunities at unsignalized locations;
    - Upgrade intersection designs and traffic signals;
    - Improve pedestrian sidewalks and crosswalks;
    - Apply access management strategies.

- *All Facilities: Complementary Strategies*
  - Expansion and improvement to existing transit system (and alternative modes)
  - Increased travel demand management strategies

In the case of the arterial roadways, several already have specific recommendations for improvement, as documented in various CMS corridor studies. These recommendations should be included in the Plan for eventual implementation.

What follows is a description of these recommendations along with examples of facilities that are candidates for improvements.

Freeways and Highways

There are two types of congestion that affect the region's highway network, mostly during the peak periods of travel: recurring congestion and non-recurring congestion. In most cases, recurring highway congestion is caused by insufficient capacity at highway segments (i.e., too few traffic lanes, lack of lane continuity, etc.) and traffic flow turbulence at locations where vehicles merge, diverge, and weave across lanes to change direction (i.e., interchanges, access and egress points). Non-recurring congestion is due to random crashes and other traffic incidents (e.g., disabled vehicles) that impede mobility, and cause delays and frustration to all drivers. Based on this differentiation of congestion types and the experience gained through highway monitoring, the following types of highway improvement programs are seen as priority for the region's highways in order to improve mobility:

- **Recurring congestion along highway segments –** Appropriate strategies are those that correct existing inconsistencies in travel-lane continuity (where traffic volume warrants it) and those that increase the person-throughput of the highway. Examples of such projects include[1]:
  - Route 1 between Copeland Circle in Revere and Route 99 in Saugus
  - Route 1A between Curtis Street north of Logan Airport and Mahoney Circle in Revere
  - Route 128 from I-95 in Peabody to Brimbal Avenue in Beverly
  - Route 128/I-95 from I-93 interchange Reading to I-95 split in Peabody
  - Route 128/I-95 from Route 9 in Wellesley to Route 24 in Randolph
  - Route 3 from Route 18 (Exit 16) in Weymouth to Route 14 (Exit 11) in Duxbury

- **Person-throughput increasing strategies –** These include, maintaining and monitoring the existing two HOV facilities (I-93 South/Southeast Expressway and I-93 North) and planning, constructing, and operating additional HOV lanes, where feasible. Usually, the most effective

[1] The list of examples under this and all following categories of roadway improvements is based on two sources: findings from the CMS monitoring program and recommendations that resulted from corridor, subarea and other planning MPO studies that were also performed as part of the CMS program. In most cases, these studies were performed under the direction of a Task Advisory Group. Examples are not listed in any particular order.

candidates for such treatment are radial highways, which lead to a common employment destination.

- **Delay and safety improvement at interchanges –** Recommended projects include the redesign and construction of on- and off-ramps that are currently substandard. In some cases this type of operational improvements may be sufficient. In others cases, ramps and entire interchanges may have to be rebuilt and, in yet others, entirely new interchanges may be necessary. Examples of such improvements include:
  - Provide missing ramp connections between Route 1 and Route 16 in Revere/Chelsea
  - Make improvements to the interchanges of Route 1 with Essex Street, Main Street, and Walnut Street, Saugus
  - Grade-separate the intersection of Route 1A with Boardman Street, Boston/Revere
  - Grade-separate the intersection of Route 1A and Route 16
  - Grade-separate the intersection of Route 1A with Route 60 (Mahoney Circle), Revere
  - Provide a direct connection between Route 1A and the Chelsea Street bridge to Chelsea
  - Grade-separate Route 2 westbound with Cambridge Turnpike cutoff, Lincoln, Concord
  - Replace the Concord Rotary with a grade-separated interchange, Concord
  - Reconstruct I-93/I-95 interchange, Canton and Westwood
  - Reconstruct I-93/I-95 interchange, Woburn and Reading

- **Non-recurring congestion –** In this category, the emphasis should be on effective incident management involving the detection, verification, response, and removal of highway incidents. Incident management is the coordinated, pre-planned use of human and technological resources to restore full capacity after an incident occurs, and the provision of information to motorists until the incident is cleared. To that objective, key functions for a successful incident management program include traffic surveillance, traffic operations centers, traveler information, and other supportive Intelligent Transportation System (ITS) programs and services. Incident Management already exists in the Boston MPO region and is operated by MassHighway in coordination with other state agencies with emergency response responsibilities. In addition, a variety of supportive ITS functions are currently being planned through an updated ITS regional architecture for the Boston MPO area. These programs are very important as they seek to maintain existing capacity on the region's highways. For this reason, they deserve continuous funding and expansion/enhancement, as appropriate.

Arterial and Collector Roads

In addition to freeways and highways, the CMS program monitors the performance of about 1,300 miles of the MPO's arterial and collector roadway network. Presently, during the peak periods, 15% of the monitored roadway segments operate at speeds lower than 20 mph; 60% operate at speeds below 35 mph. The typical speed limit for these types of roads is 25 to 40 mph. These and

other results from the CMS program point to two sets of recommendations for roadway mobility improvements, depending on whether the road is in Boston proper and inner suburbs or in the outer suburbs. These recommendations target only the operational improvement of the existing arterial and collector system. On a final note, increasing capacity by adding a lane may be an appropriate strategy, but only if all other reasonable alternative strategies cannot accommodate the travel demand. In such a case, consideration should also be given to the incorporation of appropriate features to facilitate future demand management and operational improvement strategies.

1. Boston and Inner Suburbs

- *Stricter enforcement of existing parking regulations* – This strategy is necessary to reduce double-parking, illegal parking at designated MBTA bus stops, and other illegal parking activities that affect traffic throughput and pedestrian safety, and interfere with bus schedule adherence. Example roadway segments where such parking violations happen and that impede the smooth flow of traffic in the peak periods include:
    - Huntington Avenue west of Tremont Street
    - Commonwealth Avenue and Beacon streets in the Back Bay area
    - Commonwealth Avenue and Beacon streets in Kenmore Square.
- *Operational improvements and traffic management strategies* – These include signal upgrade and coordination programs, adaptive control traffic signal priority systems, pedestrian signals, and access management programs. All these strategies aim at improving the throughput at intersections, systems of intersections, and mid-block locations for general traffic, transit vehicles (buses and light rail transit) and pedestrians without adding right-of-way capacity. Presently, about 70% of the top 50 most congested CMS-monitored intersections in the region are located in the Inner Core area (of them, about half are actually located in the towns of Lynn, Revere, Everett, and Medford). In most cases, operational improvements and traffic management techniques are the only appropriate roadway improvement strategies. Such project examples include:
    - Boston's Traffic Signal System Upgrade
    - Traffic signal priority for Bus Rapid Transit implementation (Silver Line)
    - Traffic signal priority for Green Line branches

2. Outer Suburbs

Preliminary CMS results show that arterial congestion (measured as delay at monitored intersection approaches) by subregion ranks as follows: Metrowest, NSPC, SWAP, TRIC, MAGIC, SSC, and NSTF. This information may be used to guide decisions for project inclusion during preparation of the Plan and other MPO planning documents.

The table below shows the towns and routes that appear most frequently[2] in the top 25 most congested monitored intersections in each subregion.

[2] The most congested *route* may not be located in the town that has the most congested *locations*.

Metrowest	Framingham*	Route 126, 135**
NSPC	Wilmington†	Routes 28, 129, 62, 3/3A
SWAP	Milford, Bellingham, Holliston	Routes 16, 140, 126, 85
TRIC	Stoughton, Medfield, Westwood	Routes 109, 138, 139, 135
MAGIC	Burlington, Bedford, Lexington	Routes 62, 4/225, 2A, Middlesex
SSC	Weymouth, Hanover, Hingham	Routes 53, 139, 18
NSTF	Salem, Swampscott, Beverly	Routes 1A, 107, 114

* Has by far the most congested intersections in the Metrowest region.
** Both routes, by far, have the most congested intersections in the Metrowest region.
†Woburn, Stoneham, and Reading tie for second in terms of most congested intersections in NSPC.

Of the roadways listed above the following were actually studied in detail as part of corridor or subarea study that resulted from the CMS: Route 126 in Framingham, Route 16 in Milford, Route 109 from Milford to Dedham, Route 138 from Milton to Stoughton, Route 53 from Quincy to Kingston, and Route 18 (in association with the development of the Naval Air Station).

The specific recommendations for these corridors, which can be found in the relevant documentation of each study, are recommended for inclusion in the Plan for eventual implementation. Typical recommendations include:

- Downtown parking management and traffic circulation
- Traffic signal coordination
- Left turn bypass opportunities at unsignalized locations
- Intersection and traffic signal upgrades
- Pedestrian sidewalks and crosswalks
- Access management

The remaining roadways may have associated recommendations/design plans that resulted from other studies and should also be considered for inclusion in the Plan. If planning studies do not exist, then reconnaissance and/or planning studies must be initiated to examine the problems and recommend solution strategies for implementation.

All Facilities: Complementary Strategies

Transit System Improvements – Transit, and other alternative modes, play a role in reducing the demand for roadway capacity. Increasing the use and viability of these modes will have a positive effect on increasing mobility. Please refer to other planning efforts (such as the PMT and service planning studies) for recommendations of these types of strategies.

Transportation Demand Management Strategies – These include commuter programs and services geared at reducing single-occupant vehicle travel, such as carpool and vanpool ridematches, traveler information, and employee/work place incentives (including telecommuting). These programs are

usually planned and facilitated by CARAVAN, transportation management associations, regional chamber of commerce offices, and city and town officials. Since these programs aid urban and suburban mobility, they should also be considered for inclusion in the Plan.

Bicycle and Pedestrian Improvements – Roadways provide the means for pedestrians and bicyclists to access activity centers and transit stations. Furthermore, off-street connections to/from roadways complement the existing on-street system. Making sure that both systems are integrated (i.e., connected safely and without impediments) helps to increase the mobility and accessibility of pedestrians and bicyclists. The CMS recommends that roadway projects integrate the construction of improvements that will enhance the non-motorized travel experience and connectivity. In addition, the CMS recommends studies and programs that will address the accessibility of transit stations by bicycle and walk modes.

APPENDIX B

Environmental Justice and the Regional Transportation Plan

Profiles of Communities of Concern

Allston/Brighton

The neighborhoods in Allston/Brighton that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 101, 103, 105, 106, 109 and 111. These TAZs run from the Charles River, south along the I-90 ramps and along Commonwealth Avenue to Cleveland Circle. Over 28,800 people live in these neighborhoods, approximately 37% of whom are minorities. The median income within the individual traffic analysis zones ranges from $22,396 to $32,500. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
101	1,764	389	22.05%	$32,500	58.24%
103	1,763	767	43.51%	$30,888	55.35%
105	5,349	2,488	46.51%	$25,559	45.80%
106	8,079	3,116	38.57%	$29,155	52.25%
109	5,533	2,441	44.12%	$22,396	40.14%
111	6,385	1,538	24.09%	$32,419	58.10%

This area of Allston/Brighton is served by the "B" Green Line and five bus routes. The "B" Line makes 16 stops in the community of concern. The roundtrip fare on the Green Line is $3.00.

The bus lines that serve this area of Allston/Brighton are:

- 57 - Watertown Square to Kenmore Station
- 64 - Oak Square to Central Square or Kendall Square
- 66 - Harvard Square to Dudley Station
- 70/70A - Cedarwood, N. Waltham or Watertown Square to University Park
- 86 - Sullivan Square Station to Cleveland Circle

The roundtrip fare on the bus system is $1.50.

The Massachusetts Turnpike bisects the Allston/Brighton community of concern and has major on and off ramps in the area.

According to the 2000 Census, approximately 19% of the households located within the community of concern own one or more vehicles, while the journey-to-work mode split for automobiles is 40%. Within this area of Allston/Brighton, approximately 15,901 people 16 years of age or older are currently in the workforce or actively seeking employment, while 10,734 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 2.6 to 41.7% in these TAZs in Allston/Brighton.

Profiles of Communities of Concern

Chinatown

The Boston neighborhood of Chinatown that comprises the Environmental Justice Community of Concern encompasses traffic analysis zones (TAZs) 37, 40, 41, 42. Two major highways bound Chinatown, I-90 to the south and I-93 to the east. About 7,000 people live in this neighborhood, 68% of whom are minorities. The median income within the individual traffic analysis zones range from $9,071 to $18,359. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
37	1,421	426	26.69%	$17,220	30.86%
40	941	208	22.10%	$9,071	16.26%
41	2,233	1,851	82.89%	$18,359	32.90%
42	2,248	2,166	96.35%	$14,050	25.18%

Chinatown is served by the Red, Orange and Green rapid transit lines. Access to the rapid transit system can be made at the South Station (Red), Park St. (Green and Red), Downtown Crossing (Red and Orange), Chinatown (Orange), New England Medical Center (Orange) and Boylston (Green). Boylston station is the only station that is not accessible to all persons. The roundtrip fare within the rapid transit system is $2.00.

South Station is the terminus for all commuter rail lines south of the Charles River: the Worcester, Needham, Franklin, Attleboro/Stoughton, Fairmount, Middleborough/Lakeville and Plymouth/Kingston. Commuter rail fares range from $4.00 to $11.50 roundtrip depending on the destination.

The Silver Line connects Boylston, Chinatown and New England Medical Center stations to Dudley Square. Bus system fare (including the Silver line) is $1.50 roundtrip.

Several Bus lines serve the Chinatown community:

3/6 Boston Marine Industrial Park
7 City Point, Otis and Summer Streets
11 City Point Bayview route
448/449 Wonderland, Lynn, Marblehead
459 North Beverly and Salem Depot
500 Express Bus to Riverside
501 Express Bus to Brighton Center
504 Express Bus to Watertown Square and Copley Square
505 Express Bus to Waltham
553/554 Roberts, Waltham and Newton Corner
556/558 Waltham Highlands via Newton Corner

Intercity bus and train service is available at South Station. Additional bus service is provided from Chinatown to New York by Fung Wah Transport Vans, Travel Pack, and Sunshine Travel.

According to the 2000 Census, approximately 28% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 24%. Within the area of Chinatown, approximately 3,603 people 16 years of age or older are currently in the workforce or actively seeking employment, while 2,660 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 6.8% to 36.5% in these TAZs in Chinatown.

The transportation needs of this community include easy access to transit and highways, Orange Line extension and outreach in local languages. Many residents are Asian immigrants with good manufacturing skills. Because of this, the community has a significant number of workers reverse commuting to the suburbs to skilled manufacturing jobs. In many cases these workers use a "shadow" private transit network operated by employers. The creation of an employer-managed Chinatown TMA is suggested by some community members.

Chinatown is located at the hub of many regional transportation facilities. The I-90 and I-93 intersection defines the southern and eastern boarders of Chinatown; South Station is to the east of Chinatown. This neighborhood has endured 10 years of Central Artery/Tunnel construction during which congestion and environmental impacts such as air and noise pollution were very high. Mitigation of the environmental impacts of these facilities is important to the community. An important component of that is the community's active role in determining the future land uses of new development sites created by the Central Artery development.

Community connections to highways are important due to the reverse commuting to car dependent employment centers. Long-term solutions include more comprehensive suburban transit options including the North-South rail link. Currently, a large segment of the Chinatown population uses the Red Line to travel between Boston and Quincy.

Profiles of Communities of Concern

Dorchester

The neighborhoods in Dorchester that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 159, 160, 161, 163, 165, 166, 167, 168, 171 and 175. This area extends from Uphams Corner in the north to Gallivan Boulevard to the south between the Fairmount commuter rail line and the Red Line. The area around UMASS Boston is included in the communities of concern. Over 46,000 people live in these neighborhoods, over 85% of whom are minorities. The median income within the individual traffic analysis zones range from $27,548 to $41,387. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
159	3,882	3,603	92.81%	$ 27,548	49.37%
160	3,458	2,482	71.78%	$ 36,667	65.71%
161	4,795	4,263	88.91%	$ 32,725	58.65%
163	3,346	2,398	71.67%	$ 31,553	56.55%
165	3,190	2,187	68.56%	$ 32,958	59.06%
166	3,547	3,385	95.43%	$ 37,145	66.57%
167	6,291	5,729	91.07%	$ 35,583	63.77%
168	3,684	3,596	97.61%	$ 32,417	58.09%
171	6,750	5,843	86.56%	$ 41,387	74.17%
175	7,679	6,279	81.77%	$ 36,009	64.53%

This area of Dorchester is served by the Fairmount commuter rail line which currently only has stations on the northern (Uphams Corner) and southern (Morton St.) corners of the environmental justice community of Dorchester. The stations are not accessible to all persons and have no parking available. There are 22 round trips a day on the Fairmount line that operates inbound service operates from 6:07 in the morning to 10:17 at night, while outbound service runs from 6:08 to 9:48. The roundtrip fare is $3.00.

The MBTA's Red Line serves the area with the Fields Corner, Shawmut and Ashmont stations. Round trip fare on the Red line is $2. Fields Corner and Shawmut stations are not accessible to all persons, while Ashmont Station is accessible and has bicycle storage facilities. Transfer to the bus system is available at the Fields Corner and Ashmont stations. Roundtrip fare in the bus system is $1.50.

The Fields Corner Red Line Station is a bus hub with service to:

15 - Ruggles Station via Kane Square
17 - Andrew Station via Uphams Corner
18 - Ashmont Station and Andrew Station
19 - Ruggles Station
20 - Neponset and Adams Belt
210 - Quincy Center

The Ashmont Red Line Station is a bus line hub with service to:

18 - Andrew Station via Fields Corner
21 - Forest Hills
23 - Ruggles Station
26 - Norfolk and Morton Belt Line
215 - Quincy Center
217 - Wollaston Station

240 - Holbrook/Randolph commuter rail station
Brockton Area Transit also operates a bus to the Red Line's Ashmont Station.

Other buses that serve this area are:
8 - Harbor Point/Umass to Kenmore Station
16 - Forest Hills Station to Andrew Station or UMass
27 - Mattapan Station to Ashmont Station via River St.
41 - Centre and Eliot Stations to JFK/Umass Station

According to the 2000 Census, approximately 65% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 59%. Within this area of Dorchester, approximately 20,183 people 16 years of age or older are currently in the workforce or actively seeking employment, while 13,114 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 8.0 to 13.8% in these TAZs in Dorchester.

Community representatives expressed the need for improved quality of service for all transit modes operating in Dorchester:

- Restoration of the Red Line stations
- Rehabilitation of the Indigo (Fairmount) Line
- Transfer Silver Line technology to other buses to improve quality of service-possibly with dedicated lanes for right-of-way B service.
- Destinations that need better connections to Dorchester include, South Bay, downtown Boston, and Jamaica Plain. Despite Jamaica Plain's proximity, travel time from neighborhoods in Dorchester can be excessive.
- Increased bus frequency to reduce overcrowding

Profiles of Communities of Concern

East Boston

The neighborhoods in East Boston that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 69, 70, 71, 72, 73, 78, and 79. This area includes all the communities south of Waldemar Avenue on the East Boston Peninsula with the exception of Logan International Airport. Over 38,000 people live in these neighborhoods, over 50% of whom are minorities. The median income within the individual traffic analysis zones range from $24,693 to $40,000. The population in these
TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ					
TAZ	Population	Minority	Minority %	Median Income	Regional %
69	7,035	3,536	50.26%	$ 33,058	59.24%
70	4,388	3,181	72.49%	$ 24,693	44.25%
71	8,939	5,539	61.96%	$ 30,632	54.90%
72	4,587	2,564	55.90%	$ 29,212	52.35%
73	3,697	1,865	50.45%	$ 32,359	57.99%
78	3,914	774	19.78%	$ 28,496	51.07%
79	5,797	1,869	32.24%	$ 40,000	71.68%

Five stations of the Blue line serve this area of East Boston:
- Maverick - Not accessible, bicycle parking facilities, no parking facilities
- Airport - Not accessible, no parking facilities*
- Wood Island - Accessible, bicycle parking facilities, no parking facilities
- Orient Heights - Accessible, bicycle parking facilities, 434 parking spaces, 2 accessible parking spaces
- Suffolk Downs - Accessible, bicycle parking facilities, 110 parking spaces, 4 accessible parking spaces

Roundtrip fare on the Blue line is $3.00.

Roundtrip fare on the bus system is $1.50. Buses from Maverick Station:
114/116/117 - Wonderland Station via Revere Street
120 - Orient Heights Station via Bennington Street
121- Wood Island Station via Lexington Street
Other lines:
112 - Wellington Station via Mystic Mall, Quigley Hospital and Admiral's Hill

Water ferry service is available from the Hyatt Harborside Hotel at Logan Airport.

According to the 2000 Census, approximately 59% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 47%. Within this area of East Boston, approximately 17,786 people16 years of age or older are currently in the workforce or actively seeking employment, while 12,393 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 4.6% to 9.1% in these TAZs in East Boston.

East Boston has a disproportionate share of regional transportation burdens due to its position between downtown and the north shore communities and the proximity of Logan International Airport. The Sumner and Callahan Tunnels enter East Boston from downtown Boston. Several express buses (424, 434, 441, 442, 450 and 455) pass through the neighborhood without stopping.

* The Airport Blue Line Station is currently under construction and will be made accessible

Profiles of Communities of Concern

Jamaica Plain/Mission Hill

The neighborhoods in Jamaica Plain/Mission Hill that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 93, 99, 100 and 131. This area extends from Ruggles Street in the north to Center Street in the south, bounded by the Longwood "D" Green Line and the Orange line. Over 19,000 people live in these neighborhoods, over 60% of whom are minorities. The median income within the individual traffic analysis zones range from $15,361 to $32,454. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
93	4,166	2,261	54.27%	$ 15,361	27.53%
99	8,118	4,267	52.56%	$ 29,188	52.31%
100	3,640	2,150	59.07%	$ 32,454	58.16%
131	3,089	2,786	90.19%	$ 19,687	35.28%

The Arborway "E" Green Line and the Orange Line serve this area of Jamaica Plain/Mission Hill. Roundtrip fare on the Green Line is $3.00. None of the transit stations have onsite parking available. The accessible stations in the area are: Heath Street, Brigham Circle and Longwood Medical Area stations of the Green Line; and Ruggles, Roxbury Crossing and Jackson Square stations of the Orange Line.

Roundtrip fare on the bus system is $1.50. Several bus lines serve these neighborhoods.
Ruggles Orange Line Station is a major bus hub with service to:

CT2 - Sullivan Station via Kendall Square
CT3 - Beth Israel Deaconess Medical Center to Andrew Station
8 - Harbor Point/Umass to Kenmore Station
15 - Kane Square or Fields Corner Station
19 - Fields Corner Station via Grove Hall and Dudley Square
22 - Ashmont Station via Talbot Avenue and Jackson Square
23 - Ashmont Station via Washington Street
28 - Mattapan Station via Dudley Square
42 - Forest Hills Station via Washington Street
43 - Park and Tremont Streets
44 - Jackson Square
45 - Franklin Park Zoo via Blue Hill Avenue
66 - Harvard Square to Dudley Station
MIS (Mission Hill Link bus)

Bus service from Jackson Square is available to:

29 - Mattapan Station via Seaver Street
41 - Centre and Eliot stations to JFK/UMass Station via Dudley Station
44 - Ruggles Station via Seaver St.
48 - Jamaica Plain Loop Monument via Green Street

Other lines serving this area are:

14 - Heath Street to Roslindale via Dudley Station
39 - Forest Hills Station to Back Bay Station via Huntington Ave
66 - Harvard Square to Dudley Station

Major roadways serving these neighborhoods include Huntington Avenue and Tremont Street.

According to the 2000 Census, approximately 52% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 34%. Within this area of Jamaica Plain/Mission Hill, approximately 9,005 people 16 years of age or older are currently in the workforce or actively seeking employment, while 7,003 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 4.6% to 15.0% in these TAZs in Jamaica Plain/Mission Hill.

Commuter rail lines of Attleboro/Stoughton, Needham and Franklin pass through the community, but do not stop.

Profiles of Communities of Concern

Mattapan

The neighborhoods in Mattapan that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 179, 174, 196, 197 and 198. This area is bordered by Harvard Street on the west, Talbot Avenue on the north, Washington Street on the east and the Neponset river to the south. Over 35,000 people live in these neighborhoods, over 97% of whom are minorities. The median income within the individual traffic analysis zones range from $26,845 to $38,517. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
173	8,093	7,985	98.67%	$26,845	48.11%
174	7,766	7,404	95.34%	$36,556	65.51%
196	6,172	5,947	96.35%	$38,517	69.03%
197	8,147	8,067	99.02%	$32,439	58.13%
198	5,321	5,120	96.22%	$37,676	67.52%

The Fairmount commuter rail line serves this area of Mattapan. The Morton Street station is not accessible to all persons and has no parking facilities. Roundtrip fare to South Station from Morton Street Station is $4.00.

The MBTA's Red line and Mattapan High Speed Line serve the area with the following stations:

- Fields Corner - Not accessible, no parking facilities
- Shawmut - Not accessible, no parking facilities
- Ashmont - Acessible, bicycle parking facilities
- Cedar Grove - Not accessible, no parking facilities
- Butler - Not accessible, 60 parking spaces
- Milton - Not accessible, 41 parking spaces. 4 accessible parking spaces
- Central Avenue - Not accessible, no parking facilities
- Valley Road - Not accessible, no parking facilities
- Capen Street - Not accessible, no parking facilities
- Mattapan - Not accessible, bicycle parking facilities, 216 parking spaces, 4 accessible spaces

Round trip fare on the Red line is $2. Transfer to the bus system is available at the Fields Corner and Ashmont stations:

The Ashmont Red Line Station is a bus line hub with service to:

18 - Andrew Station via Fields Corner
21 - Forest Hills
23 - Ruggles Station
26 - Norfolk and Morton Belt Line
27 - Mattapan Station
215 - Quincy Center
217 - Wollaston Station
240 - Holbrook/Randolph commuter rail station
Brockton Area Transit also operates a bus to the Red Line's Ashmont Station.

From Mattapan Station

24 - Wakefield Avenue and Truman Parkway
27 - Ashmont station

28 - Ruggles Station via Dudley Square
29 - Jackson Square via Seaver Street
30 - Forest Hills Station or Roslindale Square
31 - Forest Hills Station via Morton Street
33 - Dedham Line via River Street
245 - Quincy Center via Quincy Hospital
716 - Cobbs Corner (operated by A&B Bus Lines)

Roundtrip fare on the bus system is $1.50.

According to the 2000 Census, approximately 71% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 62%. Within this area of Mattapan, approximately 14,751 people16 years of age or older are currently in the workforce or actively seeking employment, while 10,707 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 7.3% to 14.0% in these TAZs in Mattapan.

Mattapan is a community of low income, middle class and affluent residents. The proposed improved Fairmount Line stop at Morton Street will be crucial to the area's mixed use redevelopment.

Community issues:

- A commuter rail station in Mattapan
- A Red Line extension to Mattapan
- Improved safety and convenience on the Red Line

Profiles of Communities of Concern

Roxbury

The neighborhoods in Roxbury that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 133, 134 and 170. This area extends from Massachusetts Avenue to Morton Street north to south, and the Fairmount Commuter Rail Line and the Orange Line east to west. Over 64,000 people live in these neighborhoods, over 94% of whom are minorities. The median income within the individual traffic analysis zones range from $16,646 to $39,366. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
115	1,841	1,404	76.26%	$ 32,794	58.77%
116	2,189	2,081	95.06%	$ 18,919	33.91%
117	4,711	4,278	90.81%	$ 16,646	29.83%
118	2,531	2,125	83.96%	$ 36,591	65.58%
119	2,921	2,792	95.58%	$ 32,397	58.06%
120	2,424	2,355	97.15%	$ 26,238	47.02%
121	4,222	4,035	95.57%	$ 24,933	44.68%
122	2,863	2,818	98.43%	$ 25,132	45.04%
123	4,575	4,488	98.10%	$ 28,175	50.49%
124	3,250	3,070	94.46%	$ 24,000	43.01%
125	4,575	4,537	99.17%	$ 24,778	44.41%
126	2,806	2,761	98.40%	$ 27,147	48.65%
127	4,251	4,197	98.73%	$ 18,478	33.11%
128	3,252	3,150	96.86%	$ 37,250	66.76%
129	5,139	5,100	99.24%	$ 28,188	50.52%
133	4,017	3,240	80.66%	$ 27,204	48.75%
134	2,502	1,953	78.06%	$ 39,366	70.55%
170	6,470	6,361	98.32%	$ 23,151	41.49%

These neighborhoods of Roxbury are served by the Fairmount commuter rail line. Morton Street and Uphams Corner stations are not accessible and have no onsite parking. Fare is $3.00 round trip. The Orange Line has five stations in the Roxbury Environmental Justice Area of Concern. All Orange Line stations are accessible. Stony Brook and Jackson Square Station have bicycle parking facilities. Round trip fare is $2 within the rapid transit system.

Ruggles Orange Line Station is a major bus hub with service to:

CT2 - Sullivan Station via Kendall Square
CT3 - Beth Israel Deaconess Medical Center to Andrew Station
8 - Harbor Point/Umass to Kenmore Station
15 - Kane Square or Fields Corner Station
19 - Fields Corner Station via Grove Hall and Dudley Square
22 - Ashmont Station via Talbot Avenue and Jackson Square
23 - Ashmont Station via Washington Street
28 - Mattapan Station via Dudley Square
42 - Forest Hills Station via Washington Street
43 - Park and Tremont Streets
44 - Jackson Square
45 - Franklin Park Zoo via Blue Hill Avenue
66 - Harvard Square to Dudley Station

MIS (Mission Hill Link bus)

Bus service from Jackson Square is available to:

29 - Mattapan Station via Seaver Street
41 - Centre and Eliot stations to JFK/ UMass Station via Dudley Station
44 - Ruggles Station via Seaver Street
48 - Jamaica Plain Loop Monument via Green Street

Other lines serving this area are:

CT1- Central Square (Cambridge) to Boston Medical Center
1 - Harvard/Holyoke Gate to Dudley Square
14 - Heath Street to Roslindale via Dudley Station
16 - Forest Hills Station to Andrew Station
21 - Ashmont Station to Forest Hills Station via Neponset and Adams Belt
29 - Mattapan Station to Jackson Square via Seaver Street
31 - Mattapan Station to Forest Hills Station via Morton Street
47 - Central Square (Cambridge) to Broadway Station

Roundtrip fare on the bus system is $1.50. Major roadways in the area are Massachusetts Avenue, Blue Hill Avenue and Washington Street.

According to the 2000 Census, approximately 57% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 55%. Within this area of Roxbury, approximately 25,426 people 16 years of age or older are currently in the workforce or actively seeking employment, while 20,605 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 7.1% to 18.7% in these TAZs in Roxbury.

Roxbury is an area of heavy transit usage. Improvements suggested by community representatives include:

- More reliable and less crowded bus service
- Phasing out of diesel bus service to lower-emission vehicles
- Improved bus to rapid transit connections
- Conversion of bus routes to transit
- More direct access to rapid transit (Light Rail/Washington Street, new Fairmount Line stops)
- Upgrade Ashmont Line stations
- Plans for addressing housing cost impacts from transportation investments.

Profiles of Communities of Concern

South Boston

The neighborhood in South Boston that comprises the Environmental Justice Community of Concern encompasses traffic analysis zones (TAZs) 152 and 156. These neighborhoods are south of Dorchester Street and east of the I-93. Just under 8,000 people live in these neighborhoods, over 36% of whom are minorities. The median income within the individual traffic analysis zones range from $15,732 to $25,891. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
152	5,026	1,526	30.34%	$25,891	46.40%
156	2,903	1,348	46.43%	$15,732	28.19%

JFK/UMass Station provides access to both the commuter rail system and the rapid transit system. The Middleborough/Lakeville and Plymouth/Kingston commuter rail lines stop at the accessible JFK/UMass Station. Round trip fare to zone 8 costs $10.00; while fare to downtown Boston is $2.00 roundtrip. Inbound service on the Middleborough/Lakeville has three trains in the morning (7:45 A.M. to 8:52 A.M.) and three outbound trains in the evening (3:51 P.M. to 8:16 P.M.). Inbound service on the Plymouth/Kingston line stops at JFK/UMass on four trains in the morning (7:58 A.M. to 10:52 A.M.); four trains stop with outbound service in the evening (2:51 P.M. to 10:46 P.M.)

The Red Line serves this area of South Boston with two stations. JFK/UMass and Andrew stations are accessible but have no parking facilities onsite. Roundtrip fare on the MBTA's rapid transit system is $2.00. The Red Line operates from 5:20 A.M. to 12:15 A.M. Andrew station is also a bus hub:

CT3 - Beth Israel Deaconess Medical Center via B.U. Medical Center
5 - City Point to McCormack Housing
10 - City Point to Copley Square via B.U. Medical Area
16 - Forest Hills Station via Columbia Road
17 - Fields Corner Station via Uphams Corner and Edward Everett Square
18 - Ashmont Station via Fields Corner Station
171 - Dudley Station to Logan Airport

Other buses serving the community are:

8 - Harbor Point/UMass to Kenmore Station
9 - City Point to Copley Square via Broadway Station
11 - City Point to Downtown Bayview route

Roundtrip fare on the bus system is $1.50. Major roadways serving this area are Old Colony Road, Columbia Road and Dorchester Street.

According to the 2000 Census, approximately 55% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 51%. Within this area of South Boston, approximately 3,094 people 16 years of age or older are currently in the workforce or actively seeking employment, while 2,914 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 6.2% to 7.3% in these TAZs in South Boston.

Many regional transportation facilities pass through the community, however access to these facilities from the community is limited.

Profiles of Communities of Concern

South End

The neighborhoods in the South End of Boston that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 62, 64, 66 and 67. This area is roughly bounded by Massachusetts Avenue to the south, Tremont Street to the west, the Massachusetts Turnpike to the north and the I-93 Central Artery to the east. Over 6,400 people live in these neighborhoods, over 74% of whom are minorities. The median income within the individual traffic analysis zones range from $13,698 to $21,163. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
62	1,832	1,730	94.43%	$ 13,698	24.55%
64	2,392	1,702	71.15%	$ 20,772	37.23%
66	1,344	866	64.43%	$ 21,163	37.93%
67	906	509	56.18%	$ 12,995	23.29%

This area of the South End is within the capture area of the Orange Line stations of New England Medical Center, Back Bay/South End and Massachusetts Avenue. All three stations are accessible. Roundtrip fare on the MBTA rapid transit system is $2.

The Silver Line bus transit service runs through the center of the Environmental Justice Community of Concern. The accessible stops of Herald Street, East Berkeley Street, Union Park Street, Newton Street and Worcester Square are all located along Washington Street.

Roundtrip fare on the bus system is $1.50. Buses serving the area are:

- CT1 - Central Square (Cambridge) to Boston Medical Center
- CT3 - Beth Israel Deaconess Medical Center to Andrew Station
- 3 - Boston Marine Industrial Park to South Station
- 8 - Harbor Point/Umass to Kenmore Station
- 9 - City Point to Copley Square via Broadway Station
- 10 - City Point to Copely Square via Andrew Station
- 11 - City Point to Downtown Bayview route
- 43 - Ruggles Station to Park and Tremont Streets
- 47 - Central Square (Cambridge) to Broadway Station

According to the 2000 Census, approximately 38% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 40%. Within this area of the South End, approximately 2,469 people 16 years of age or older are currently in the workforce or actively seeking employment, while 2,782 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 6.6% to 31.7% in these TAZs in the South End.

This neighborhood of the South End is located at the interchange of the Massachusetts Turnpike and I-93. This area is a major component of the Central Artery/Tunnel project, under construction for the past 10 years. The MBTA's Albany Street bus garage facility is also in the proximity of the community.

Profiles of Communities of Concern

Cambridge

The neighborhoods in Cambridge that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 265, 266 and 288. These represent two separate communities in the city of Cambridge. Traffic analysis zones 265 and 266 are located east of the Central Square Red Line Station, north of Massachusetts Avenue and south of Hampshire Street. TAZ 288 is located east of the Alewife Red Line Station. Over 9,600 people live in these neighborhoods, over 67% of whom are minorities. The median income within the individual traffic analysis zones range from $26,044 to $35,500. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
265	1,940	1,367	70.46%	$26,044	46.67%
266	3,255	2,029	62.33%	$35,500	63.62%
288	4,493	3,143	69.95%	$30,398	54.48%

These areas of Cambridge are served by the Red Line. TAZs 265 and 266 are located near Central Square Station (accessible, no parking available. TAZs 288 is located near Alewife Station. Alewife Station is accessible and has 2,595 parking spaces (24 accessible).

There are many buses serving these two areas of Cambridge. Roundtrip fare on the bus system is $1.50. For TAZs 265 and 266 bus lines from Central Square Station are:

- CT1 - B.U. Medical Center
- 1 - Harvard/Holyoke Gate to Dudley Square via Massachusetts Avenue
- 47 - Broadway Station via South End Medical Area
- 64 - Oak Square
- 83 - Rindge Avenue via Porter Square
- 91 - Sullivan Square Station via Washington Street

Other bus lines serving TAZs 265 and 266 are:

- CT2 - Sullivan Square to Ruggles Station via Kendall Square
- 68 - Harvard/Holyoke Gate to Kendall Square
- 70/70A - Cedarwood, North Waltham or Watertown Square to University Park
- 85 - Spring Hill to Kendall via Summer St.

For TAZ 288, bus lines serving the community are:
Lines from Alewife Station

- 62/76 - Bedford V.A. Hospital or Hanscom Air Base
- 79 - Arlington Heights via Massachusetts Avenue
- 84 - Arlmont Village
- 350 - North Burlington via Burlington

Other Lines serving TAZ 288:

- 77 - Arlington Heights to Harvard Station via Massachusetts Avenue
- 77A - North Cambridge to Harvard Station (local)
- 78 - Arlmont Village to Harvard Station via Park Circle
- 83 - Rindge Avenue to Central Square via Porter Square

The principle roadway serving the areas is Massachusetts Avenue.

According to the 2000 Census, approximately 60% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 37%. Within this area of Cambridge, approximately 5,250 people 16 years of age or older are currently in the workforce or actively

seeking employment, while 2,467 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 5.8% to 7.9% in these TAZ s in Cambridge.

Transit projects improving system connectivity such as the Urban Ring also concern these neighborhoods.

Profiles of Communities of Concern

Chelsea

The neighborhoods in Chelsea that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 204, 205, 206, 207 and 208. This area represents the entire city of Chelsea, from the Revere Beach Parkway to the north and Chelsea Creek to the south and east. Over 35,000 people live in these neighborhoods, over 61% of whom are minorities. The median income within the individual traffic analysis zones range from $28,390 to $32,545. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
204	7,541	5,722	75.88%	$31,801	56.99%
205	4,597	3,482	75.75%	$31,071	55.68%
206	4,338	2,513	57.93%	$28,304	50.72%
207	10,256	6,513	63.50%	$28,390	50.88%
208	8,348	3,426	41.04%	$32,545	58.32%

Chelsea is served by the Rockport/Newburyport commuter rail line. The station is not accessible to all persons and has no parking available on site. 25 round trip trains operate on the line each day with service concentrated in the peak commuting hours. Inbound service operates from 6:03 in the morning to 11:44 at night, while outbound service runs from 6:53 to 12:21. The roundtrip fare within Zone 1 is $2.00, while the maximum interzone fare (to the northern termini) is $7.00 roundtrip. Chelsea has no direct rapid transit access. Route 1 bisects the city of Chelsea intersecting with Revere Beach Parkway in the northern section of the city.

Bus lines serving Chelsea:

- 111 From Revere to Haymarket
- 112 From Wellington Station and Quigley Hospital to Wood Island Station
- 114/116/117 Wonderland Station to Maverick Station

Roundtrip fare on the bus system is $1.50.

According to the 2000 Census, approximately 68% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 65%. Within this area of Chelsea, approximately 14,212 people 16 years of age or older are currently in the workforce or actively seeking employment, while 12,182 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 2.9% to 8.5% in these TAZs in Chelsea.

The environmental justice community of Chelsea has several transportation needs. Community representatives highlighted improvement in transit connectivity as a major concern. Community resources such as Chelsea High School and medical centers need to be connected to the community via transit in a more effective manner. Long travel times to many points in the Boston region (even geographically close points) create major disconnects for the environmental justice community of Chelsea. The quality of service on buses are substandard: they are overcrowded, have long headways, no shelters, mal-functioning heaters or air conditioners, and no schedules are posted.

The roadway system is congested and creates both air and noise pollution in the community. Route 1 creates a major community burden, both as a physical barrier and as a generator of congestion and pollution. The two bridges connecting to East Boston are unsafe. Burdens such as heavy truck use on the Parkway Plaza connection to Boston on Rtes. 16 and 1, were also pointed out by community representatives.

Improvements suggested by community representatives include:

- Posting schedules at the commuter rail stop
- Improving Maverick Station
- Creation of the Urban Ring transit system
- Water taxi connection
- Improvement of Chelsea Street Bridge and other community bridges.

Profiles of Communities of Concern

Framingham

The neighborhood in Framingham that comprises the Environmental Justice Community of Concern encompasses traffic analysis zone (TAZ) 594. This TAZ is located south of Waverly Street and north of the General Motors facility. Over 9,400 people live in this neighborhood, over 56% of whom are minorities. The median income in this traffic analysis zone is $27,152. The population in this TAZ is shown in Table 1:

Table 1: Population Characteristics by TAZ					
TAZ	**Population**	**Minority**	**Minority %**	**Median Income**	**Regional %**
594	9,417	5,346	56.77%	$27,152	48.66%

This area of Framingham is served by the Worchester commuter rail line. The station is handicapped accessible and includes a 166-space parking garage, 8 spaces of which are reserved for persons with disabilities. Inbound service operates from 6:05 in the morning to 12:30 at night, while outbound service runs from 5:50 to12:12. The roundtrip fare within Zone 5 is $4.00, while the maximum interzone fare (to the northern termini) is $11.50 roundtrip.

Local Intra-Framingham Transit (LIFT) operates five bus lines in Framingham. The fare is $1.50 each way ($0.75 for seniors and disabled), and they operate on one hour headways.

According to the 2000 Census, approximately 81% of the households located within this TAZ own one or more vehicles, while the journey-to-work mode split for automobiles is 91%. Within this area of Framingham, approximately 4,085 people 16 years of age or older are currently in the workforce or actively seeking employment, while 2,884 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census is 6.4% in this TAZ in Framingham.

Profiles of Communities of Concern

Lynn

The neighborhoods in Lynn that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 303, 304, 305, 307, 308, 309, 311, and 313. This area extends from just north of Eastern Avenue (Route 129) to the Revere city line and from just west of Western Avenue (Route 107) to the Atlantic Ocean. Over 46,000 people live in these neighborhoods, over 53% of whom are minorities. The median income within the individual traffic analysis zones range from $18,489 to $36,474. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
303	255	137	53.73%	$18,489	33.13%
304	6,060	2,180	35.97%	$24,453	43.82%
305	6,681	2,194	32.84%	$36,474	65.37%
307	6,823	4,227	61.95%	$22,699	40.68%
308	8,450	5,690	67.34%	$23,372	41.89%
309	7,239	3,922	54.18%	$31,597	56.63%
311	4,739	2,433	51.34%	$31,597	56.63%
313	6,203	3,679	59.31%	$30,726	55.06%

This area of Lynn is served by the Rockport/Newburyport commuter rail line. The station is accessible and includes a 965-space parking garage, 23 spaces of which are reserved for persons with disabilities. Inbound service operates from 5:53 in the morning to 11:34 at night, while outbound service runs from 7:36 to 12:29. The roundtrip fare within Zone 2 is $5.50, while the maximum interzone fare (to the northern termini) is $7.00 roundtrip. These TAZs are also served by myriad bus routes providing connections to downtown Boston, the major shopping malls in Danvers, Peabody and Saugus, and some major employment sites on the North Shore (e.g., Centennial Park in Peabody). Lynn has no direct transit access. The principal roadways serving this area of Lynn are Route 1A and Route 107 for north/south travel and Route 129 for radial travel.

According to the 2000 Census, approximately 70% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 77%. Within this area of Lynn, approximately 20,372 people 16 years of age or older are currently in the workforce or actively seeking employment, while 14,662 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 2.9 to 10.3% in these TAZs in Lynn.

- The major transportation needs in this community include better commuter rail service to serve non-commuter trips.
- Extension of the Blue Line to Lynn.
- MBTA Lynn bus garage on Western Avenue is a regional transportation burden incurred by the community.

Profiles of Communities of Concern

Quincy

The neighborhoods in Quincy that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 436 and 437. This area extends from Quincy Center in the south to the community north of Broad Meadow. Over 5,700 people live in these neighborhoods, over 14% of whom are minorities. The median income within the individual traffic analysis zones range from $26,907 to $32,647. The population in these
TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ					
TAZ	**Population**	**Minority**	**Minority %**	**Median Income**	**Regional %**
436	1,411	313	22.18%	$ 32,647	58.51%
437	4,367	474	10.85%	$ 26,907	48.22%

Quincy Center Station is a regional hub for commuter rail, the Red Line and several bus lines. The station is accessible to all persons and has 872 onsite parking spaces 16 of those are fully accessible.

The Middleborough/Lakeville and Plymouth/Kingston commuter rail lines stop at the Quincy Center Station. Round trip fare to zone 8 costs $10.00; while fare to downtown Boston is $5.00 roundtrip. Inbound service on the Middleborough/Lakeville has twelve trains stopping at Quincy Center (6:06 A.M. to 10:05 P.M.) and twelve outbound trains (6:52 A.M. to 10:41 P.M.). Inbound service on the Plymouth/Kingston line stops at Quincy Center two times in the morning (6:13 A.M. and 7:51 A.M.); three trains stop with outbound service one in the morning (9:01 A.M.) and two in the evening (5:02 P.M. and 5:41 P.M.).

The Red Line stops at Quincy Center. Roundtrip fare on the MBTA's rapid transit system is $4.00 from Quincy Center. The Red Line operates from 5:20 A.M. to 12:15 A.M. Quincy Center is also a terminus for many bus lines:

- 210 - North Quincy Station or Fields Corner Station
- 211 - Squantum via Montclair and North Quincy
- 212 - North Quincy Station via Billings
- 214 - Germantown via Sea Street and Oceanview
- 215 - Ashmont Station via West Quincy
- 216 - Houghs Neck via Sea Street
- 220/221/222- Hingham, Fort Point or East Weymouth via Fore River Bridge and Old Hingham Center
- 225 - Weymouth Landing via Quincy Avenue and Shaw Street
- 230 - Montello Commuter Rail Station via Holbrook
- 236 - South Shore Plaza via East Braintree
- 245 - Mattapan Station via Quincy Hospital

Roundtrip fare on the bus system is $1.50.

According to the 2000 Census, approximately 69% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 75%. Within this area of Quincy, approximately 2,261 people16 years of age or older are currently in the workforce or actively seeking employment, while 2,893 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 0.9% to 2.4% in these TAZs in Quincy.

Community representatives report that while the majority of those employed use private automobiles, a significant number of residents use public transportation, particularly subway, to get to work and other destinations. TAZ 437 is well served by bus routes that connect to Quincy Center and the MBTA Red Line station there. TAZ 436 is within the downtown development area and accessible to bus routes and the subway. The city itself is served by a number of bus routes which enable residents to reach destinations all over the city.

Planned transportation improvements of broad concern to the two Environmental Justice neighborhoods of concern are: the Quincy Center Concourse, phase 2 project and the Burgin Parkway Interchange project. Specific impacts of these projects will be identified as plans progress, but may include impacts on traffic flow and volume, air quality, and parking and pedestrian routes.

Profiles of Communities of Concern

Revere

The neighborhood in Revere that comprises the Environmental Justice Community of Concern encompasses traffic analysis zone (TAZ) 210. This area extends from just north of Eastern Avenue (Route 129) to the Revere city line and from just west of Western Avenue (Route 107) to the coastline. Over 8,300 people live in this neighborhood, over 50% of whom are minorities. The median income in this traffic analysis zone is $30,028. The population in this TAZ is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
210	8,308	4,154	50.00%	$30,028	53.81%

Four stations of the MBTA's Blue Line serve this area of Revere. Each station is accessible and provides parking for bicycles. Onsite parking is available at Suffolk Downs (110 spaces, 4 accessible spaces), Beachmont (430 spaces, 6 accessible spaces) and Wonderland (1257 spaces, 18 accessible spaces). Roundtrip fare on the Blue Line is $2.00. The northern terminus of the Blue Line, Wonderland Station, also acts as a bus hub with service to:

110 - Wellington Station
116/117 - Maverick Station via Revere Street
411 - Malden Center Station to Jack Satter House via Granada Highlands
424W - Eastern Avenue and Essex Street to Haymarket Station, Downtown Boston
426W - Central Square, Lynn to Haymarket Station via Cliftondale
441W - Marblehead to Haymarket, Downtown Boston
442W - Marblehead to Haymarket, Downtown Boston
448 - Marblehead to Haymarket, Downtown Boston
449 - Marblehead to Haymarket, Downtown Boston
450W - Eastern Avenue and Essex Street to Haymarket Station, Downtown Boston
455W - Salem Depot to Haymarket via Central Square, Lynn

Other bus lines serving the area are:

119 - Northgate to Beachmont Station via Revere Center
120 - Orient Heights Station to Maverick Station via Bennington Street

Roundtrip fare on the bus system is $1.50.

According to the 2000 Census, approximately 69% of the households located within this TAZ own one or more vehicles, while the journey-to-work mode split for automobiles is 64%. Within this area of Revere, approximately 3,678 people16 years of age or older are currently in the workforce or actively seeking employment, while 2,636 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census is 9.0% in this TAZ in Revere.

Profiles of Communities of Concern

Salem

The neighborhood in Salem that comprises the Environmental Justice Community of Concern encompasses traffic analysis zone (TAZ) 455. This area extends from just north of Eastern Avenue (Route 129) to the Salem city line and from just west of Western Avenue (Route 107) to the coastline. Over 3,800 people live in this neighborhood, about 58% of whom are minorities. The median income in this traffic analysis zone is $29,732. The population in this TAZ is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
455	3,871	2,240	57.87%	$29,732	53.28%

This area of Salem is served by the Rockport/Newburyport commuter rail line. The station is handicapped accessible and includes a 340-space parking garage, 8 spaces of which are reserved for persons with disabilities. Inbound service operates from 5:43 in the morning to 11:24 at night, while outbound service runs from 6:54 to 12:38 AM. The roundtrip fare within Zone 3 is $6.00, while the maximum interzone fare (to the northern termini) is $10.00 roundtrip.

Roundtrip fare on the bus system is $1.50. All bus lines serving this TAZ have a terminus at the Salem commuter rail station. From there, the lines go to:

450 Haymarket
451 North Beverly commuter rail station
455 Lynn commuter rail station
456 Lynn commuter rail station
459 Downtown Boston via Logan Airport
465 North Shore Mall and Danvers Square
468 Danvers Square

Salem is not served by a rapid transit line. The principal roadways serving this area of Salem are Route 114 and Route 107.

According to the 2000 Census, approximately 76% of the households located within this TAZ own one or more vehicles, while the journey-to-work mode split for automobiles is 77%. Within this area of Salem, approximately 1,667 people 16 years of age or older are currently in the workforce or actively seeking employment, while 1,177 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census is 6.7% in this TAZ in Salem.

Commuter rail does not meet the needs of the environmental justice community. Several planned projects (the South Salem garage and the Extension of the Blue Line to Lynn or Salem) will impact the environmental justice community without providing large benefits. Roadway projects may simply cause an increase in traffic. People in the minority community walk, use taxis, or carpool. The MBTA has rerouted several buses (based on the 1990 census) to better serve the minority community. There is a Welfare to Work program that serves 15 people.

Residents work primarily in hospitals or in the service industry in Salem, Beverly, or Peabody. Boston is not an employment base for many of the residents of the environmental justice community of Salem. Therefore focusing resources on radial service to and from downtown Boston does not serve this community. Furthermore, work schedules of low-income workers usually do not correspond to the traditional nine-to-five commuting hours, therefore the addition of off-peak service would help to serve the

needs of this community to a greater degree than expansion of service. Improved connections should include locations in Salem, Beverly, Peabody and the Lynn campus of the North Shore Community College.

Planned transportation improvements of concern to the community are:

- Expansion of parking garage at Salem Station
- Extension of Blue Line to Salem
- Improvements to Boston Street and Bridge Street

Profiles of Communities of Concern

Somerville

The neighborhoods in Somerville that comprise the Environmental Justice Community of Concern encompass traffic analysis zones (TAZs) 242, 243 and 245. This area is bounded by I-93 in the east, the Cambridge city border on the south, Union Square in the west and Broadway in the north. Over 15,000 people live in these neighborhoods, over 40% of whom are minorities. The median income within the individual traffic analysis zones range from $34,466 to $37,036. The population in these TAZs is shown in Table 1:

Table 1: Population Characteristics by TAZ

TAZ	Population	Minority	Minority %	Median Income	Regional %
242	2,066	815	39.45%	$37,036	66.37%
243	8,881	4,232	47.65%	$36,477	65.37%
245	4,336	1,075	24.79%	$34,466	61.77%

The Sullivan Square Station of the Orange Line serves this area of Somerville. Sullivan Square Station is accessible and has 222 parking spaces (7 accessible spaces). Roundtrip fare on the MBTA's rapid transit system is $2.00. Sullivan Square Station also serves a hub for bus service. Roundtrip fare on the bus system is $1.50. From Sullivan Square, buses go to:

CT2 - Ruggles Station via Kendall/M.I.T.
86 - Cleveland Circle via Harvard/Johnson Gate
89 - Clarendon Hill via Broadway
90 - Davis Square to Wellington Station
91 - Central Square, Cambridge via Washington Street
92 - Assembly Square Mall to Downtown Boston
93 - Downtown Boston via Bunker Hill Street and Haymarket
95 - West Medford via Mystic Avenue
101 - Malden Center Station via Salem Street, Main Street and Broadway
104/109 - Malden Center Station via Broadway Linden Square and Glendale Square
105 - Malden Center Station via Newland Street Housing

Other buses serving this section of Somerville are:

80 - Arlington Center to Lechmere Station via Medford Hills
85 - Spring Hill to Kendall/M.I.T. Station via Summer Street and Union Square
87 - Arlington Center or Clarendon Hill to Lechmere Station
88 - Clarendon Hill to Lechmere Station via Highland Avenue

According to the 2000 Census, approximately 71% of the households located within these TAZs own one or more vehicles, while the journey-to-work mode split for automobiles is 62%. Within this area of Somerville, approximately 8,295 people 16 years of age or older are currently in the workforce or actively seeking employment, while 4,474 are either retired, unable to work, or are chronically unemployed and have ceased seeking employment. Based upon these variables, the unemployment rate as reflected in the 2000 Census ranges from 3.1% to 3.5% in these TAZs in Somerville.

The environmental justice community of Somerville has many transportation burdens and needs. Interstate 93 and four commuter rail lines pass through the community without providing access to their service. These regional transportation facilities create significant environmental impacts in the community without providing an access or mobility benefit. Congestion on local streets impact important areas of the community especially along Route 28.

Somerville is densely populated. Residents have diverse ethnic backgrounds and speak many languages – Spanish, Portuguese, Brazilian, and Southeast Asian languages – and often don't speak English. Sensitivity to local languages must be addressed in outreach efforts.

Convenient access to employment centers in a major issue in the community. The community has high transit usage despite the lack of rapid transit serving the area around Union Square. The community expressed concerns that transit service is not meeting present and future travel demands.

Since the primary public transportation mode serving the community is the MBTA's bus system, it has suffered a regionally disproportionate burden as the bus fleet continues to age. Additional service such as radial bus connections to employment centers, more off-peak bus service, and protection for low-cost housing stocks as a precursor to additional transit investment are important issues facing the community.

Proposed Environmental Justice Methodology For the 2003 Regional Transportation Plan

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1.0 Background

In response to the Boston MPO's 2000-2025 Update to its Regional Transportation Plan the Federal Highway Administration (FHWA) and the Federal Transit Agency (FTA) requested the MPO perform an environmental justice assessment of the region. The focus of this analysis is to determine if low-income and minority communities are being equitably served by the current and proposed future transportation system in the Regional Plan. In order to answer this question the MPO needs to first identify what inequities currently exist in the transportation system and then identify the projects that can help minimize or eliminate them. The 2003 Regional Transportation Plan will use the current-state-of-the-practice methodologies as recommended by the FHWA and the FTA to comply with this request The CTPS *Regional Model* will be used in this analysis. The environmental justice assessment involves seven steps.

1. Identify the *target populations* in the MPO that match the MPO definition of low-income and minority communities.
2. Determine what level of *geography* the results will be presented in.
3. Define the *modes* that will be used in the analysis.
4. Examine the relative *mobility* characteristics of the target areas within a scenario and between different scenarios at a systems-level.
5. Analyze the *accessibility* of target areas to selected destination types within a scenario and between different scenarios at a systems-level.
6. Develop *performance level* measures for quality of service for all the transit modes in order to determine what disparities exist between the target areas and the rest of the region or sub-regions for the base year.

This memorandum will focus on the methodology being used to perform steps one through six. Step seven will be explained in more detail in a subsequent memo. The proposed methodology described in this paper will identify key points for the analysis as well as point out possible alternative methodology that the committee may want to consider.

2.0 Regional Model

The regional travel model set that is being used for the Regional Transportation Plan is based on procedures and data that have evolved over many years at the CTPS. The model set is of the same type as those used in most large urban areas in North America. It uses the best component models, networks and input data available at CTPS at this time. The model set is used to simulate existing travel conditions and to forecast future year travel on the entire Eastern Massachusetts transit and highway system. As such, it contains all the MBTA transit rail and bus lines, commuter boat service and all the private express bus carriers. In the highway system, all express highways and principle arterials and many minor arterial and local roadways are included. The transit and highway components combined, create the transportation network used in the model.

The model covers the entire Eastern Massachusetts region consisting of 164 towns and cities. It simulates the modes and routes and magnitude of trips that are made in the modeled area. Population, employment, number of households, auto ownership, highway and transit levels of service, downtown parking costs, auto operating costs and transit fares are some of the most important inputs that are used in applying the model to a real world situation. These inputs are constantly updated so that the model set simulates current travel patterns with reasonable accuracy.

All of the analysis using the Regional Model will be done using traffic analysis zones (TAZ's). A TAZ is a geographic area that consists of one or more census blocks, block groups, or census tracts. Their main purpose is to provide a unit of geography will allow similar number of trips to be assigned accurately onto the transportation network.

The CTPS travel model can produce several important statistics related to the region's transportation system. Some of them are listed below.

- Travel times from an origin to a destination by mode of travel.
  Note: Travel time can be measured in real time or weighted to a value based on what people perceive. All of the analysis described in this memo proposes to look at only real travel time measures.
- Average daily transit ridership by transit sub modes.
- Average mode split by geographic region.
- Average trip length for transit and auto trips.
- Total vehicle miles and vehicle hours of travel, made by all vehicles on a typical weekday in the entire Eastern Massachusetts region and sub-regions.
- Average speed of traffic in the region.
- Daily traffic volumes on major freeways, expressways and arterials.
- Volume to Capacity ratios on major freeways, expressways and arterials.
- Amount of air pollution produced by the autos, locomotives and buses.
- Total number of daily trips made by auto and transit in the region.

These outputs will be generated for different time periods, forecast year no-build and build scenarios. The results will be presented on a daily basis. They will form the basis for the Mobility, Accessibility, & Equity Analyses discussed later in this memorandum.

3.0 Target Populations

In order to help identify what the target populations should be and where they are located, the Environmental Justice Committee (EJC) used census data and personal insight in the criteria development. The populations initially considered were low income, non-English speaking, and minority population. Based on discussion within the EJC, low-income and minority populations were separated out for the study using the following definition.

> *Low-income target areas are defined as those with income less then 75% of the MPO median income. Minority population target areas were defines as*

populations with more than 21.4% of the community total. Statistical profiles, insight from EJ members, and suggestions from the CTPS can help perfect this list.

The following terminology will be used to describe the population and areas being studied in this memo.

- Target populations - includes both low-income and minority populations
- Target groups – represents either the low-income or the minority population
- Target areas – defines all of the areas that have a given target group
- Target corridors/clusters – identifies groups of target zones
- Target zones – identifies the zones that have either low-income or minority populations located in them
- Target geography – This identifies the smallest level of geography used to determine what target populations are included in what target zones

4.0 Geography

This step will focus on how the data will be aggregated for the analysis. This aggregation will be based on TAZ's. Every targeted population will be identified with the TAZ that it is located in. For the mobility, accessibility, and equity analysis several key points relating to aggregation of TAZ's need to be considered.

- The analysis will be performed for the 101 communities within the Boston MPO Region, which is a subset of the 164 cities and towns in the modeled area.
  Issue: Should we look at destinations in the accessibility analysis outside of the MPO?
- Target area locations won't change in the future year.
- The target areas will be grouped together within a scenario in order to develop the measures for the system-level analysis of mobility, accessibility, and equity; then these results will be compared with the build scenarios.
- To take into account the urban & suburban characteristics of the regions the MPO will be split geographically into two areas that take these characteristics into account.
  Note: One possible definition of urban & suburban could be to call the inner core urban and all of the other sub-regions in the MPO suburban.
- Target groups can be examined using target areas, target corridors, and target zone as units of analysis.
- A corridor/cluster level analysis will be performed if necessary to examine impacts on a limited number of selected groupings of TAZ's that the EJ C may decide are important to look at. The corridor/cluster will be used to examine homogenous areas with the MPO.
  Note: A neighborhood like Roxbury that is made up of several TAZ's could be looked at.
- An analysis of geography of target populations within a scenario and between different scenarios.

5.0 Modes

The regional model allows us to examine several different modes of transportation. The two these analysis will focus on are the auto and transit modes This methodology proposes that for each scenario we will look at the average auto times, average transit times, and average costs inherent in the modeling process incurred from a TAZ to the following:

- Within a scenario & between scenarios
- For the Regional Model study area
- By MPO region
- By urban and suburban areas
- By target areas
- For selected target corridors/clusters
- For selected target zones

6.0 Mobility Analysis

Mobility refers to the ease of movement of people, goods, and services across the region. The mobility analysis involves two levels. The first involves presenting and comparing system-wide statistics related to the region's transportation system, several of which are listed below.

- Average daily transit ridership by transit sub-modes.
- Average weekday station boardings.
- Average mode split by geographic region.
- Average trip length for transit and auto trips.
- Total vehicle miles and vehicle hours of travel, made by all vehicles on a typical weekday in the entire Eastern Massachusetts region and sub-regions.
- Average speed of traffic in the region .
- Daily traffic volumes on major freeways, expressways and arterials.
- Volume to Capacity ratios on major freeways, expressways and arterials.
- Amount of air pollution produced by the automobile traffic, trains, and buses.
- Total number of daily trips made by auto and transit in the region.

The second part of the mobility analysis will look at the average travel time and distances by mode. For the no-build scenario, several comparisons can be made within it based on the target group, geography, and by mode. The average travel time by mode for a target area can then be compared with the following average travel times.

- Regional Model Study Area
- MPO Region
- Urban and Suburban Areas
- Target areas & groups
- Selected target corridors/clusters
- Selected target zones

These comparisons are not independent of one-another but can be used together to refine the process. Target corridors/clusters or target zones can be compared within an urban / suburban geographic breakdown is one example.

The changes in travel time for each one of these dimensions within a scenario can be used a benchmark to compare with the build scenarios. A comparison can be made using anyone or a combination of the following:

- Statistical comparisons of average travel times
- Absolute differences between average travel times
- Relative differences between average travel times

This breakdown by geography and type of analysis can also be used to compare average trip distances for the target zones.

7.0 Accessibility Analysis

This analysis will quantify the accessibility of the selected origin target zones to selected destination zones. At a minimum, federal requirements ask us to look at destinations consisting of higher educational facilities, employment, and health care facilities. The measures used in this analysis will attempt to quantify the number of facilities available within a pre-determined travel time from any given target zone using the following approach.

Higher educational Facilities

1. Higher educational facilities will be broken down into community colleges, other two-year institutions, and 4-year schools.
2. The model will be used to estimate auto and transit travel times from each selected target zones to all TAZ's in the Modeled Area.
3. The type of educational facility will be weighted in this analysis by its current enrollment in order to reflect the number of educational opportunities that it may have.
4. The total number of educational facilities within 10, 20, 30, or more minutes of each target zone and by mode will be presented for the no-build scenario.
5. This will be repeated for the build scenarios.
6. The enrollment will be weighted by the size of the target group to develop an average number of educational facilities available to that target group.
7. Comparisons within a scenario and between scenarios by mode can be made using this information.

Employment

1. Employment data is available for ten different sectors of the economy. These will be grouped together for (total employment) in this analysis.

Note: It is possible to look at specific types of employment if the EJC feels it is appropriate to group them or focus on only one sector . The types of employment consist of the following:

- Service employment
- Government employment
- Primary education
- Secondary education
- Financial, insurance, & real-estate
- Retail
- Wholesale
- Manufacturing
- Agriculture, mining, & construction
- Transportation, communications, & utilities

2. The model will be used to estimate auto and transit travel times from each selected target zones to all TAZ's in the Regional Modeled Study Area.
3. The total employment within 10, 20, 30, or more minutes of each target zone for each zone and by mode will be presented for the no-build scenario.
4. The employment will be weighted by the size of the target group to develop an average number of employment opportunities available to that target group.
5. This will be repeated for the build scenarios and compared with the no-build.
6. Comparisons within a scenario and between scenarios by mode can be made using this information.

Health Care Facilities

1. Locations of health care facilities will be based on what on the best available information is at the time of the analysis.
2. The model will be used to estimate auto and transit travel times from each selected target zones to all TAZ's in the Regional Modeled Study Area.
3. The total numbers of health care facilities within 10, 20, 30, or more minutes of each target zone and by mode will be presented for the no-build scenario.
4. This will be repeated for the build scenarios.
5. The number of health care facilities will be weighted by the size of the target group to develop an average number of health care facilities available to that target group.
6. Comparisons within a scenario and between scenarios by mode can be made using this information.

Memorandum

To: Environmental Justice Committee
From: Pam Wolfe
Date: March 25, 2003 (Revised July 18)

Re: **Environmental Justice Community Transportation Needs Assessment Common Themes – March Update**

Community members of the MPO's Environmental Justice Committee have provided brief descriptions of the communities they represent and summaries of their transportation needs and issues of concern. In spite of geographic differences, there were common themes expressed.

The low income and minority communities often share:

- **Mobility-dependence –** A relatively high percentage of residents do not have automobiles and are either dependent on transit, if their community is served, or on carpools, vanpools, or taxis.
- **Language and cultural diversity –** For many residents in low income or minority communities, English is a second language and many are not fluent and do not read English. This presents great difficulties for use of our English-based transit system.
- **Poor air quality –** High traffic volumes through the communities (including diesel trucks and buses) and severe congestion adds pollution which is a health problem. Some communities report higher than average asthma rate.
- **Concerns about possible gentrification –** Several communities believe that transportation improvements will result in housing cost impacts that may, if not controlled, displace current residents.
- **Concerns about major construction impacts**.

Frequently identified transportation needs include:

- **Service improvements for existing transit –** Safety, state of repair, age of fleet, cleanliness, access, station improvements, connections, schedule and arrival information and other ITS services, schedule adherence, bus shelters, over-crowding, and frequency of service were highlighted for improvement. Bus schedules do not always meet shift-schedule needs (including late night, early morning and weekend service.) Fare discounts should be available for low-income patrons.
- **Transportation to de-centralized destinations** - Transit doesn't meet residents' destination-needs. Access to some destinations (located in neighboring communities, in manufacturing and service locations along highways or in industrial parks; or to those that require trips to the central core and transfers to a radial line) is awkward and difficult. Boston is not always the main employment destination. Residents' jobs are often spread out in suburban areas and must be accessed by highway. New and more flexible bus services should be created to meet these needs. Communities closer

to Boston maintain Boston as the main destination, however east-west services should be improved.

- **Reduction of traffic impacts –** Highway through-traffic creates problems and traffic flow should be improved/reduced. Highways have created negative visual impacts and have divided communities.

MEMORANDUM

Date: July 15, 2003

To: Transportation Planning and Programming Committee

From: Anne McGahan, Manager, Transportation Plan
Scott Peterson and Pam Wolfe, Co-Managers, Environmental Justice Assessment

Re: Recommendations of the Environmental Justice Committee to the MPO

The Environmental Justice Committee (committee) has met frequently since its organization in spring 2002 to discuss and provide input on the Addendum to the 2000 Plan Update, the system-level assessment work scope, analysis, and identification of transportation needs. Most recently, the committee reached consensus on a series of recommendations for the transit portion of the 2004-2025 Regional Transportation Plan. The committee will continue discussions, including examination of highway projects, and will make additional recommendations during the public comment period.

Recommended Projects

The committee supports many of the transit projects already included in the two alternative 2025 Build Scenarios. Members gave the Arborway Restoration, Fairmount Branch Improvements, Urban Ring Phases 1&2, 100 Additional Buses to Improve Service on Existing Routes, and Assembly Square Orange Line Station projects a High rating. They rated the Red Line/Blue Line Connector, Medford Hillside Green Line, and North Shore Transit Improvements[*] (including the committee recommendation of extending service to Salem) projects a Medium rating.

Members gave several projects Low ratings: the Russia Wharf Ferry Terminal, Old Colony/Greenbush Commuter Rail, and Silver Line Phase 3 projects. Members didn't think there were benefits for environmental justice target neighborhoods associated with these projects.

Members support Light Rail from Dudley to Park Street replacing the existing bus rapid transit service. They gave this service a High rating and asked that it be modeled in a build scenario and also be included in the recommended plan. They suggest that implementing this project would replace the existing Silver Line service, but not preclude construction of Silver Line 3.

[*] The MBTA is looking at a number of options as part of the North Shore Major Investment Study.

Other Recommendations

The Committee agreed on the following additional recommendations for transit projects:

- Expedite implementation of the 100 Additional Buses project. The current schedule which shows implementation between 2010-2015 should be moved forward.
- Use DMUs on the Fairmount Branch instead of diesel locomotives.
- Continue developing the Suburban Mobility program. Members think that this project, now included as a planning project, is very important as a likely way to address transportation needs in Target suburban neighborhoods.
- Flex highway funds to transit. Members feel that flexing is a way to make more funds available for the transit projects they support.

Process Improvement

While appreciating the scope and accomplishments of the system-level analysis, some committee members expressed their concerns that the current process did not adequately identify projects that meet their communities' transportation needs or their expectations for a productive process. They would like to be involved in a substantive way earlier in the certification documents' development. Members asked that they be involved in designing improvements for the environmental justice process.

<u>MEMORANDUM</u>

TO: **Transportation Planning and Programming Committee** **July 18, 2003**
Boston, MPO

FROM: **Scott Peterson, Planner**
CTPS

RE: **Preliminary Environmental Justice Results for the 2004-2025 Regional Transportation Plan: Comparison of the No-Build with the Build 1 and Build 2 Scenarios**

Environmental Justice Transportation System-Level Analysis

The Boston MPO is conducting a system-level transportation analysis to learn whether there are gaps or inequities in the existing transportation system and to understand how well the recommended projects for the Regional Transportation Plan (Plan) address the needs of the region's target populations and neighborhoods in the future.

The target populations and neighborhoods consist of:

- Low income populations
- Minority populations
- English as a second language populations
- High percent zero vehicle household populations
- Seventeen target neighborhoods

During discussions with the Environmental Justice Committee in early 2003, concerns were identified relating to mobility, congestion, cut through traffic, air quality, as well as access to schools, health care, and jobs. To respond to these concerns the MPO staff identified several modelable performance measures to assess how each of the issues that the Environmental Justice Committee identified would be implemented in the Plan.

The benefits and burdens of mobility, congestion, and the environment were examined by comparing the target populations with their respective non-target populations within the MPO using predetermined performance measures. This analysis compares populations within a scenario and examined changes between the no-build and build scenarios. The benefits and burdens of access compare changes in target neighborhoods amongst themselves and examines changes between the no-build and build scenarios by target neighborhood.

<u>Performance Measures</u>

Mobility

- Average daily travel time for auto and transit, weighted by trips
- Average daily travel speeds for auto, weighted by trips
- Daily travel time savings

Congestion

- AM peak period vehicle miles of travel in congestion

Cut-through traffic

- Average daily vehicle miles of travel per auto person trips generated at the origin traffic analysis zone

Environmental Concerns
- Density of CO_2 produced by traffic analysis zone

Access to higher education
- Access to two-year higher educational facilities weighed by enrollment
- Access to four-year higher educational facilities weighed by enrollment

Access to health care
- Access to extended care facilities weighted by number of beds
- Access to health care facilities

Access to employment
- Access to service employment opportunities
- Access to retail employment opportunities
- Access to manufacturing employment opportunities
- Access to transportation, communication, & public utility employment opportunities

Summary of Results

An analysis of the model results for First and Second Build scenarios showed that all of the target populations were improving relative to the No-build scenario in mobility, congestion, and environmental concerns. Transit showed greater improvements than the auto mode. There was little difference in the magnitude of improvements experienced by target and non-targeted populations using the auto mode. Target populations using transit experienced more improvements than the non-targeted populations. The accessibility analysis showed a great deal of variability by neighborhood with some target neighborhoods showing improvement in access while others showed little to no gain in access to education, healthcare, and jobs.

Analysis of the Build 1 Scenario Produced the Following Representative Results

Average daily travel times weighted by trips:

- All target populations and non-target populations experienced decreases in average daily auto travel time relative to the no-build scenario ranging from –1% to -3%.
- There was no apparent disparity in percent reductions in auto travel time between the different populations within this scenario.
- All populations experienced decreases in average daily transit travel time relative to the no-build scenario ranging from –1% to -3%.
- The target populations, namely minority and low-income populations, experienced a higher percent reduction in transit travel time than the non-target populations within this scenario.

AM peak-period congested vehicle miles of travel (Congestion is defined as a volume to capacity ratio of greater than 0.75 on roadways):
- All target populations and non-target populations experienced decreases in congested vehicle miles of travel ranging from -4% to –9%.
- The target populations experienced a greater percent reduction than the non-target populations with the low-income population having the largest reduction.

Density of CO produced on roadways by automobiles according to traffic analysis zone:
- All populations experienced decreases in carbon monoxide emissions ranging from –1% to –6%.
- The target populations experienced a greater reduction than the non-target populations with low-income population having the largest reduction.

Access to two-year higher educational opportunities weighted by enrollment and using a threshold of 20 minutes for auto and 40 minutes by transit:

- The majority of the target neighborhoods show little to no change in enrollment opportunities while the target neighborhoods in Lynn, Salem, Dorchester, Revere, and Somerville show improved access for auto and transit.
- Lynn experiences the largest increase in enrollment opportunities with an 18% increase using the auto mode and 180% increase using the transit mode.

Access to extend care medical facilities weighted by number of beds and using a threshold of 20 minutes for auto and 40 minutes by transit:

- The majority of the target neighborhoods show little to no change in beds available while the target neighborhoods in Lynn, Salem, Dorchester, and Somerville show slight increases for auto and transit.
- Lynn experiences the largest increase in beds available with 12% for the auto mode and an increase over 100% using the transit mode.

Access to retail employment opportunities using a threshold of 20 minutes for auto and 40 minutes by transit:

- All target neighborhoods experience an increase in retail job opportunities ranging from 1% to 33% using the auto mode.
- Lynn experiences the largest increase in retail job opportunities via the auto mode with a 33% increase.
- All target neighborhoods experience an increase in retail job opportunities ranging from 1% to 60% using the transit mode.
- Lynn experiences the largest increase in retail job opportunities via the transit mode with a 60% increase.
- The North Shore target neighborhoods, Dorchester, Somerville, and South Boston see the largest increase in retail jobs via the auto and transit modes.

<u>Analysis of the Build 2 Scenario Produced the Following Representative Results</u>

Average daily travel times weighted by trips:

- All populations of concern and the comparison populations experienced decreases in average daily auto travel time relative to the no-build scenario ranging from –3% to -1%.
- There was no apparent disparity in percent reductions in auto travel time between the different populations within this scenario.
- All populations experienced decreases in average daily transit travel time relative to the no-build scenario ranging from –3% to -1%.

AM peak-period congested vehicle miles of travel (Congestion is defined as a volume to capacity ratio of greater than 0.75 on roadways):

- All populations experienced decreases in congested vehicle miles of travel ranging from -4% to –8%.
- The target populations experienced a greater percent reduction than the non-target populations with the low-income population having the greatest reduction.

Density of CO produced on roadways by automobiles by traffic analysis zone

- All populations experienced decreases in vehicle miles of travel ranging from –1% to –5%.
- The target populations experienced a larger reduction than the non-target populations with low-income population having the largest reduction.

Access to two-year higher educational opportunities weighted by enrollment and using a threshold of 20 minutes for auto and 40 minutes by transit:

- The majority of the target neighborhoods show little to no change in enrollment opportunities while the target neighborhoods in Lynn, Salem, Dorchester, Revere, and Somerville, show increases for auto and transit.
- Lynn experiences the largest increase in enrollment opportunities with an 18% increase using the auto mode and 180% increase using the transit mode.

Access to retail employment opportunities using a threshold of 20 minutes for auto and 40 minutes by transit:

- All target neighborhoods experience an increase in retail job opportunities ranging from 1% to 33% using the auto mode.
- Lynn experiences the largest increase in retail job opportunities via the auto mode with a 33% increase.
- All target neighborhoods experience an increase in retail job opportunities ranging from 1% to 60% using the transit mode.
- Lynn experiences the largest increase in retail job opportunities via the transit mode with a 60% increase.
- The North Shore target neighborhoods, Dorchester, Somerville, and the South End see the largest increase retail jobs via the auto and transit modes.

SP/sp

cc: Vijay Mahal, CTPS
Cathy Lewis, CTPS
Karl Quackenbush, CTPS

MEMORANDUM

TO: Scott Peterson

FROM: Thomas J. Humphrey

RE: Analysis of MBTA Bus Network Based on Service Measures in the Environmental Justice Section of the Regional Transportation Plan

I. Introduction

As requested, I have reviewed the tables in appendix A (Environmental Justice) of the Boston Region MPO Transportation Plan 2002 Update to try to identify areas where transit service improvements would have the greatest positive impact under the service measures used in these tables. Many of the routes that score poorly under these measures are scattered throughout the region. Some of these include only short segments within low-income or minority neighborhoods under the definitions used in the Transportation Plan. The one corridor with a large concentration of heavily patronized bus routes primarily serving minority and low-income areas is that mid-way between the Orange and Red Lines, from Mattapan Square on the south to Dudley Square and Ruggles Station on the north. More specific findings are presented below. All tables cited are in the 2002 Plan Update.

ll. Preliminary Screening Process

Table A-1A in the Transportation Plan 2002 Update classifies 170 MBTA bus routes according to whether or not they serve traffic zones with concentrations of minority or low-income residents. Based on the definitions used, 41 routes are identified as serving both low income and minority populations, 34 as serving minority but not low-income areas, 3 as serving non-minority low-income populations, and 92 as not serving concentrations of either minorities or low income residents. For purposes of the present analysis, the routes of most interest are those classified as both minority and low income, followed by those classified as low-income only. Lacking other information, residents of minority neighborhoods that are not also classified low-income are presumably less transit-dependent than residents of low income minority or non-minority neighborhoods. Consequently only the 44 low-income routes, or about one-quarter of the system total, were subjected to more detailed analysis.

III. Service Frequency

The 2002 Plan Update categorizes routes according to four ranges of service frequency. Headways of 15 minutes or under are classified as Very Frequent. Headways of 16 to 30 minutes are Frequent. Those of 31 to 60 minutes are Less Frequent, and those of over 60 minutes are Infrequent. Table A-1A shows average headways for each route for each of four weekday time intervals (A.M. peak, midday, P.M. peak, and evening), plus all-day averages for Saturdays and Sundays.

Frequency alone is not a meaningful measure of adequacy of service. Most MBTA bus routes have lengthy histories (many having evolved from street railway lines that were first established in the 1800s). Over the years, service frequencies have been adjusted to try to match supply and demand. In general, the routes that are most heavily patronized already have the most frequent service, and those with the least service are also least crowded. This should not be construed as an indication that greatly increased frequency on any route will greatly increase ridership. In most cases, routes with infrequent service had more service in the

past, but ridership levels could no longer justify allocation of as great a level of resources to those routes. Therefore, frequency was examined together with vehicle loadings, as discussed below.

It should be noted that the MBTA's Service Delivery Policy Standards call for frequencies of at least every 30 minutes during peak hours and at least every hour during off-peak hours on all routes. This standard is not met on some low-ridership routes, but the proportion of such routes in low-income minority neighborhoods is not greater than that of the system as a whole.

IV. Vehicle Loadings

Description of Measures

Table A-2A in the Transportation Plan 2002 Update shows average vehicle loadings on each route at the maximum load point during the most heavily patronized 30-minute span on a typical weekday. In this table, loads are measured in two ways - Load Factor and Crowd Factor. Load Factor is the ratio of passengers on board at the peak load point to the total number of vehicle seats provided. Crowd Factor is the ratio of passengers on board at the peak load point to the combined seating and standing capacity. Under MBTA service standards, total bus capacity is defined as 140% of seating capacity, but it is possible for an even greater number of people to fit on board.

It should be noted that the results in table A-2A do not reveal anything about how heavily patronized any route is outside of the peak 30 minutes. Some routes have large spikes in demand for reasons such as the start or end of a school day, but others without such ridership sources have more uniform patronage. In most cases, the load measures are averaged over two or more trips in the peak 30 minutes, so individual trips may be even more crowded.

The peak-load figures shown for most routes are based on a one-day observation on a randomly chosen weekday. Although these are assumed to be typical, there are no guarantees that the observations for a particular route depict a usual pattern. Finally, MBTA buses do not all have uniform capacity. In 2002, the number of seats per bus ranged from 31 to 43, with a fleet average of 40.1. The load and crowd factors in table A-2A assumed a seating capacity of 40 and total capacity of 56 per bus on all routes.

General Findings

Of the 41 bus routes serving both minority and low-income populations, 26 (63%) were found to have more passengers than seats at the maximum load point in the peak 30 minutes, including seven (17%) with maximum loads above service-standard capacity. All three low-income non-minority routes had maximum loads less than or equal to seating capacity. The figures in the table may understate the number of passengers actually standing at the peak load point on crowded trips, as some standees may block access to or view of empty seats that are not near the door.

Further investigation shows that subsequent to the observations included in Table A-2A, schedule adjustments have been made to relieve the crowding on the trips that had peak ridership in excess of service-standard capacity. Further improvements on these and other routes could still reduce the number of standees.

Dorchester and Roxbury Route Cluster

The 26 minority and low-income bus routes that had standees at the peak load points were distributed among many Boston neighborhoods or other cities and towns. There were few instances of two or more heavily patronized route serving the same area. The main exception to this was found in the sections of Dorchester and Roxbury between the Orange and Red Lines, from Mattapan Square on the south to Dudley Square and Ruggles Station on the north. This area has numerous heavily patronized local bus routes

providing feeder service to the Orange Line, and serving high concentrations of minority low-income residents. This is the same general area that would be served by a Silver Line extension from Dudley to Mattapan. The most heavily patronized of the present routes are:

Route 22 - Ashmont Station to Ruggles Station via Talbot Avenue
Route 23 - Ashmont Station to Ruggles Station via Washington Street
Route 28 - Mattapan Station to Ruggles Station via Dudley Station
Route 29 - Mattapan Station to Jackson Square Station via Seaver Street
Route 44 - Jackson Square Station to Ruggles Station via Seaver Street
Route 45 - Franklin Park Zoo to Ruggles Station

The most recent available ridechecks on these six routes showed a combined total of 43,000 riders a day, or about 21,500 in each direction. According to table A-2A, none of these routes had peak loads in excess of service standard capacity, but all of them had some standees during at least the busiest 30 minutes of the day. On Routes 23, 28, 29, and 44, the heaviest loads occurred during the A.M. peak inbound. On Route 22 the heaviest loads were during the P.M. peak outbound, and on Route 45 outbound trips during the afternoon school peak had the heaviest loads.

Routes 22, 23, and 28 alone accounted for 77% of the combined ridership. These routes also had the most service according to table A-1A. All three had headways of under 15 minutes on weekdays in the A.M. peak, midday, and P.M. peak, and 20 minutes in the evening. All three also headways of 15 minutes or less on weekend days, except that Route 23 had a 16-minute Sunday headway. Routes 29, 44, and 45 had weekday peak-period headways of 15 minutes or less, except for a 16-minute A.M. peak headway on Route 29. Off-peak headways on these routes were between 15 and 30 minutes, except that Routes 44 and 45 had 45-minute headways on Sundays and Route 29 had 60-minute midday headways and no Sunday service. It should be noted that all of the street coverage of Route 29 is also served by either Route 28 or Route 22.

Although these six routes serve the same general area of Boston and overlap with each other at several points, each of these routes provides some service that the others do not. The 1995 passenger survey found that most traffic zones from which there were reported trip origins on any of these routes showed origins on only one or two of the six, and only one zone showed origins on as many as three of them. In the zones with origins reported for two routes, all of the reported addresses were either along streets served directly by both of them, or on cross streets between the two.

The survey also showed that only 23% of the inbound riders on these routes transferred to the Orange Line to complete their trips. Transfers to other bus routes were slightly more important, at 27%, but only 6% transferred to bus routes continuing further toward downtown Boston. The greatest number (49%) completed their trips by walking from one of the six bus routes. These findings suggest that the majority of transit users in the neighborhoods served by these six bus routes are making cross-town trips, or trips within these neighborhoods. These riders could benefit most from service quality improvements on existing routes, such as increased frequency and better on-time performance, regardless of other capital improvements that may be instituted.

V. Distribution of Waiting Shelters

Table 5A of the Transportation Plan 2002 Update shows the locations of shelters at MBTA bus stops, by stop name, municipality, and Census tract, but not by route. The list shows a total of 216 shelters, of which 61 (28%) are shown as being within Boston. A more detailed examination shows that six of these shelters are located along the six routes in Dorchester and Roxbury discussed in section IV. Of these, one is near Dudley Square on Routes 23, 28, and 44, one is at Jackson Square on Routes 22, 29, and 45, one is at the outer end of Route 45 at Franklin Park, and the other three are near the middle of Route 44.

The overall figures show that the total number of bus shelters on the MBTA system is very small relative to total route-mileage, regardless of neighborhood categories. More shelters are needed throughout the system, especially at high-ridership stops. (It should be noted that subsequent to completion of the

inventory used in the Transportation Plan, additional shelters have been installed at many locations in Boston as part of the city's "street-furniture" program.)

VI. Comparisons with Commuter Rail

The commuter rail service standard vehicle capacity of 110% of seating (versus 140% of seating on buses) has been cited as an example of inequity between urban and suburban MBTA services. Table A-2A in the Transportation Plan Update does not show the average load factors on commuter rail trains. However, other sources do show that some peak-period commuter rail trains have passenger loads in excess of 110% of total seats. For example, the CTPS 2000 peak-load counts found this to be the case on several trains on the Franklin, Attleboro/Stoughton, Middleborough/Lakeville, and Plymouth/Kingston lines. In addition, some trains that had empty seats in some cars had standees in others. The average length of a commuter rail trip is much longer than that of any local bus trip in the urban core, so if a commuter rail passenger is forced to stand, the average time spent standing is much longer than most bus passengers would have to stand. A bus loaded to 140% of seating capacity would have 16 standees, but the number of standees on many individual commuter rail trains greatly exceeds this.

As discussed in section III, the most heavily patronized bus routes have very frequent service, defined as every 15 minutes or less. At present, none of the commuter rail lines has average peak-period headways as short as 15 minutes, although there are some instances of trains scheduled less than 15 minutes apart. At most stations, the average interval between peak-period trains is between 30 and 45 minutes. The disparity between off-peak headways on commuter rail and local buses is even greater.

TJH/tjh

MEMORANDUM

TO: Dennis Dizoglio, MPO Chairman

DATE: July 15, 2003

FROM: Vijay Mahal and Bill Kuttner

RE: Ridership Comparison of Silver Line Phase III and Washington Street Light Rail Transit

Responding to a request from the Environmental Justice Committee, the Working Committee of the Transportation Planning and Programming Committee directed CTPS staff to perform a comparative ridership analysis of the Silver Line Phase III with a Light Rail Transit (LRT) service on Washington Street. The purpose of this memorandum is to document the results of our analysis.

For your convenience and ready reference, a brief project description and service assumptions for the Silver Line Phase III and the Washington Street LRT are provided below.

The Silver Line Phase III project involves building an underground tunnel between New England Medical Center and South Station and providing a through-routed service (one-seat ride) from Dudley Square and Boylston Station to the Seaport area and Logan airport. When complete, the Silver Line corridor would have intermodal connections with the Orange Line at New England Medical Center and Chinatown, Green Line at Boylston, Red Line and Southside commuter rail lines at South Station and Blue Line at Airport Station. As currently envisioned, the Silver Line Phase III would consist of the following services.

Dudley to Boston Marine Industrial Park @ 10-minute headway
Dudley to Boston Convention Center @ 10-minute headway
Dudley to Logan airport @ 10-minute headway
Boylston to Boston Marine Industrial Park @ 10-minute headway
Boylston to World Trade Center @ 10-minute headway
South Station to Logan @ 10-minute headway

The effective headway of the Silver Line on Washington Street would be about 3.5 minutes during the peak periods. In the Phase III tunnel section the effective headway would be about 2 minutes during the peak periods.

The LRT on Washington Street would consist of running a service similar to the Green line from Dudley Square to Park Street Station. The level of service assumed during the peak and off-peak periods is 5 minutes and 7 minutes respectively. Due to capacity constraints in the central subway section, it would not be possible to extend the new LRT service beyond Park Street station and for the same reason, it would not be possible to provide a better frequency of service unless some service reductions are made in the other branches of the Green Line. The stopping pattern assumed for the Washington Street LRT is similar to the current Silver Line Phase I.

Table 1 presents a comparison of ridership forecasts between these two proposed improvements to the Silver line corridor. These forecasts use the most recent demographic and employment projections for 2025 developed by MAPC in May 2003.

In the No Build option, the two Silver Line services are assumed to continue to run independently: the Washington Street service would continue to Downtown Crossing, much as it does today, and the soon-to-open Piers Transitway service, including the Airport Intermodal Transit Connector (AITC), would connect South Station with the Seaport and Logan Airport.

Table 1

Silver Line Corridor

Projected 2025 Ridership

	No Build	Upgrade Washington to LRT	Integrated Silver Line
Piers Transitway + AITC	12,500	12,500	
Washington Street Service	14,750	36,800	
Integrated Silver Line			102,000
	----------	----------	----------
Total Over Corridor	27,250	49,300	102,000

The proposed completion of the Silver Line is projected to almost quadruple the ridership throughout the Silver Line corridor to 102,000 daily riders in 2025. The increase in ridership due to Phase III would be about 74,750 (102,000 – 27,250).

Upgrading Washington Street service to LRT would also increase ridership in the Silver Line corridor, even though there would still be two disconnected services. Ridership on the Washington Street segment would more than double. This is attributed primarily to the fact that there would be a more convenient transfer at Park Street to the Red Line and to Green Line trains going towards North Station and Lechmere. There would be no improvement in the Seaport area, so total ridership throughout the corridor would about double.

Seen in this context, it is perfectly reasonable that the integrated Silver Line would result in a quadrupling of corridor ridership. The key transfer to the Red Line would be made at South Station instead of at Park Street in the LRT proposal. While this moves the core service point away from Park Street, South Station is a much larger employment hub than Park Street or Downtown Crossing. The South Station area is undergoing major commercial expansion, while the Park/Downtown Crossing area is largely built out. Finally the growing Seaport District and ever active Logan Airport provide a rich set of destinations for Silver Line patrons who otherwise would remain isolated in the LRT option.

Many of the riders on the Silver Line corridor would be attracted from existing MBTA services, but some would be attracted from the auto mode, a key measure of transit effectiveness. Table 2 summarizes the power of these investment proposals to attract users away from the auto mode.

Table 2

2025 Regional Linked Transit Trips

	Linked Transit Trips	Transit Mode Share
No Build	966,050	7.27%
All recommended projects in Plan (excluding Phase III)	1,040,050	7.82%
All recommended projects in Plan	1,040,450	7.82%

(substituting Phase III with Washington Street LRT)		
All recommended projects in Plan (including Phase III but no Washington Street LRT)	1,045,250	7.86%

In 2025 there are predicted to be about a million linked transit trips (person trips, as opposed to boardings, or "unlinked" trips.) These million linked trips will represent a little over 7% of the region's trips. Completing all the transit improvements outside the Silver Line corridor envisioned in the current draft transportation plan would add almost 74,000 trips and increase the transit mode share about a half a percent to 7.82% of regional trips.

Investing in the Silver Line corridor would further increase transit mode share. The LRT upgrade would attract about 400 trips from auto, whereas the integrated Silver Line would generate about 5,200 new transit users, inching the transit mode share up to 7.86%. While the LRT upgrade would be a popular service, much of its ridership would come from existing local bus and Orange Line users. Most of the 102,000 riders on the integrated Silver Line would also be existing transit users, but 5200 would be new to transit. This is because the Silver Line presents auto users an entirely new set of transit capabilities that are otherwise awkward or non-existent.

In conclusion, a rich set of residential, commercial, and regional destinations are located astride the Silver Line corridor. A major transit investment in any segment of this corridor can be expected to attract new users, as the recent growth in Washington Street ridership after completion of Phase I clearly indicates. The model predicts, and observation of development patterns corroborates, that uniting the current Washington Street and Piers Transitway branches in an integrated Silver Line will attract significantly more riders both from auto as well as other congested transit services than an isolated enhancement of either individual branch would.

APPENDIX C

Universe of Projects

One of the primary outcomes of the Regional Transportation Plan is the development of a list of major capital expansion projects for implementation over the next twenty-one years. To select these projects, the MPO created a Universe of Projects (a list of all possible projects for selection) – one for highway projects, the other for transit projects.

The Highway Universe of Projects list is comprised of those projects included in a previously adopted Regional Transportation Plan; projects previously studied, under study or in development; and projects included in comments received during the public outreach process for both the previous 2000-2025 Plan and this 2004-2025 Plan. The Transit Universe of Projects list was derived from the MBTA's Program for Mass Transportation.

Universe of Highway Expansion Projects for the 2025 Plan Build Scenario[1]

Highway Projects Previously Included in an Adopted Future Build Scenario

Highway Projects

Community	Project	Cost
Bedford	Crosby Dr.	$3,500,000
Bedford & Burlington	Middlesex Turnpike	$12,500,000
Beverly to Peabody	Route 128 Capacity Improvements	$60,000,000
Boston	Rte. 1A/Boardman St. Grade Separation	$8,500,000
Boston	Rutherford Avenue	$67,800,000
Boston	E. Boston Haul Rd. (Chelsea Truck Rte)	$12,000,000
Boston to Newton	Double Stack Initiative	$20,000,000
Burlington	Rte. 3A	$3,000,000
Canton	East/West Connector Rd.	$7,200,000
Canton	I-93/I-95 Interchange	$27,500,000
Canton	I-95 (NB)/Dedham St. Ramp	$3,000,000
Concord	Concord Rotary	$15,000,000
Concord & Lincoln	Rte. 2/Crosby's Corner	$15,000,000
Danvers & Peabody	Rte. 1/114 Corridor Improvements	$40,000,000
Everett, Malden & Medford	Telecom City Roadways	$13,000,000
Everett, Medford & Revere	Revere Beach Parkway	$80,000,000
Framingham	Rte. 126/Rte. 135 Grade Separation	$50,000,000
Framingham	Route 9/Rte. 126 Interchange	$15,000,000
Framingham to Worcester	Double Stack Initiative	$8,000,000
Hanover	Rte. 53	$4,000,000
Hingham & Norwell	Rte. 53/Rte. 228	$2,500,000
Hingham, Rockland & Weymouth	Naval Air Station Access Improvements	$74,700,000
Hudson & Marlborough	I-495/I-290/Route 85 Interchange	$28,000,000
Lynnfield to Reading	Route 128 Capacity Improvements	$50,000,000
Malden & Revere	Rte. 1 Improvements	$33,600,000
Marlborough & Northborough	Boundary St./Goddard Rd. Connection	$2,500,000
Natick to Wellesley	Double Stack Initiative	$20,000,000
Needham & Newton	Needham St. (Highland Ave.)	$6,600,000
Quincy	Quincy Center Concourse, Phase 2	$6,000,000
Quincy	Burgin Parkway	$18,000,000
Reading & Wilmington	I-93/Rte. 129 Interchange	$15,000,000
Reading & Woburn	I-93/I-95 Interchange	To Be Determined
Revere	Mahoney Circle Grade Separation	$25,000,000
Revere	Rte. 1/Rte. 16 Interchange	$3,900,000
Revere	Rte. 1A/Rte. 16 Connection	$39,600,000
Salem	Boston St.	$2,000,000
Salem	Bridge St.	$3,000,000
Somerville	I-93/Mystic Ave. Interchange	$50,000,000
Wellesley to Beverly	Route 128 Capacity Improvements	$207,000,000
Weymouth	Rte. 18	$15,000,000
Weymouth to Duxbury	Rte. 3 South Additional Lanes	$180,000,000
Wilmington	I-93/Ballardvale St. Interchange	$15,000,000
Woburn	Boston St. Bridge	$2,000,000

[1] This listing does not include projects from the Base Case or No-Build Scenario or projects that would not normally be included in a regional transportation model.

Universe of Highway Expansion Projects for the 2025 Plan Build Scenario[1]

Highway Projects Previously Studied, Currently under Study, or in Development

Community	Project	Cost[2]
Boston	Fenway Park Highway Improvements	$26,000,000
Boston & Chelsea	Rte. 1A/Chelsea St. Bridge Connection	$34,800,000
Hudson & Marlborough	I-495/I-290/Rte. 85	$25,000,000
Littleton	Rte. 2 Interchange	$10,000,000
Salem	Commercial St./Tremont St.	$500,000
Salem	Essex St. Conversion	$2,000,000

Highway Projects Identified through Planning Efforts[3,4]

Community	Project
Lynnfield, Peabody & Saugus	Route 1 Capacity Improvements
Boston to Revere	Route 1A Capacity Improvements
Acton to Lexington	Route 2 Capacity Improvements
Arlington & Cambridge	Route 2/Route 16 Capacity Improvements
Randolph to Raynham	Route 24 Capacity Improvements
Boston to Braintree	I-93 Capacity Improvements
Somerville to Woburn	I-93 Capacity Improvements
Canton to Foxborough	I-95 Capacity Improvements
Littleton to Wrentham	I-495 Capacity Improvements

[1] This listing does not include projects from the Base Case or No-Build Scenario or projects that would not normally be included in a regional transportation model.

[2] These costs have not been updated since the production of the 2000-2025 Plan Update.

[3] The vast majority of these projects have not been analyzed sufficiently to develop a cost estimate.

[4] Although these project descriptions refer to identified highways, the actual alternative selected by the MPO, if any, might be a transit improvement.

Universe of Highway Expansion Projects for the 2025 Plan Build Scenario[1]

Highway Projects Included in Comments on the 2000 RTP[2]

Community	Project
Arlington & Cambridge	Rte. 2/Rte. 16 Interchange
Ashland	Rte. 135 Grade Separations
Bedford	Wiggins Avenue Extension
Boston	Back Bay Turnpike Exit
Boston	Central Artery/Highway Connections
Boston	Extend the I-93 HOV Lane into the City
Hopkinton	I-495/South St. New Interchange
Hudson	Washington St. Widening
Regionwide	Highway/Industrial Park Access
Regionwide	Implement the Double Stack Initiative
Regionwide	ITS Roadway Projects
Regionwide	Modern Traffic Rotaries
Regionwide	Pedestrian Improvements
Sherborn	Rte. 16/27 Improvements
Subregion (MAGIC)	Highway Mobility on State Routes
Subregion (MetroWest)	Improvements to Arterial Highways
Subregion (MetroWest)	New Turnpike Interchanges

Projects Included in Comments on the 2001 RTP Update[2]

Community	Project
Braintree	Braintree Split
Braintree	Route 3/Union Street Safety Improvements
Danvers	Access Management for Route 1A/Route 114
Framingham	Route 9/Temple Street
Gloucester	Gloucester Rotary
MetroWest Region	MetroWest Regional Bike Trail Network
Natick	Route 9/Oak Street Improvements
Newton	New Ramp from I-95 to Riverside Station
Newton	Route 9/Chestnut Street
North Shore	Route 128 Safety Improvements
Norwood	Route 1/Everett Street
Regionwide	Bike and Pedestrian Projects
Regionwide	HOV Lanes for buses
Revere to Lynn	Improved Limited Access Highway
Somerville	Depress I-93
Somerville	Route 28 Improvements
Somerville	Extension of Somerville Bike Path (Cedar Street to Lechmere)
Westborough	Route 9/I-495 Interchange *(Outside Boston MPO region)*

Projects Included in Comments on the 2004 RTP

Community	Project
Medford	Route 16/Interstate 93 Connection

[1] This listing does not include projects from the Base Case or No-Build Scenario, projects that would not normally be included in a regional transportation model, or projects that are included on the previous pages.

[2] The vast majority of these projects have not been analyzed sufficiently to develop a cost estimate.

Universe of Transit Expansion Projects for the 2025 Plan Build Scenario

Service	Screened by PMT	Project
Blue Line	X	Blue--Red connector
Blue Line	X	Wonderland Blue Line--commuter rail connector
Blue Line	X	Extension to Lynn
Blue Line		Extend from Bowdoin to Copley/Back Bay and then to Riverside, replacing the Green Line D Branch
Blue Line		Build spur direct to airport
Blue Line		Build a spur to Winthrop
Blue Line	X	Extend to Salem
Blue Line	X	Extension from Bowdoin to West Medford via Lechmere and Somerville
Orange Line	X	Extension from Oak Grove to Reading/Route 128
Orange Line	X	Extension from Forest Hills to West Roxbury/Needham
Orange Line		Extend to I-95 at both ends
Orange Line		Extend to Saugus
Orange Line		Build spur to Chelsea and Everett
Orange Line		Build a spur to Chelsea
Orange Line	X	Construct Assembly Square Station
Red Line		Extension beyond Ashmont to Mattapan in place of present streetcar service
Red Line		Northwest Extension: Alewife--Arlington Heights--Lexington
Red Line		Red Line loop to serve South Boston waterfront
Red Line		Extension along Route 3
Red Line	X	Extend from Alewife to Route 128 via Route 2
Red Line		New variation from Central Sq. Cambridge to JFK/UMass via Mass. Ave.
Red Line		Extend from Braintree to Randolph
Red Line		Replace light rail service with busway on Mattapan High Speed Line
Red Line	X	Extend to Weymouth via Plymouth/Kingston Line right-of-way
Green Line	X	Reopen Arborway--Heath St. segment
Green Line		Green Line to Brighton (Watertown Line)
Green Line		Brookline Village Connector (D Line--E Line)
Green Line	X	Green Line to Needham (branch from Riverside Line after Newton Highlands)
Green Line	X	Urban Ring: Construct a transit system following a circular route around the inner core
Green Line		Extend Riverside Line to Wellesley
Green Line		Connect Riverside Green Line station to Framingham/Worcester commuter rail
Green Line		Extend Green Line from Lechmere to Harvard Sq. via Union Sq. Somerville
Green Line		Extend Green Line from Lechmere to Saugus
Green Line		Convert Silver Line between World Trade Center and South Station to light rail and connect to Green Line at Boylston
Green Line		Build a new branch from North Station to Boylston via the Waterfront and South Station
Green Line	X	Extend the proposed Medford Hillside extension from Medford Hillside to Davis Sq. to connect with Red Line

Universe of Transit Expansion Projects for the 2025 Plan Build Scenario

Service	Screened by PMT	Project
Green Line		Extension from Lechmere to West Medford via Somerville
Silver Line	X	Build South Station--Boylston section of Silver Line
Silver Line	X	Connect Washington St. Silver Line to Boylston--World Trade Center Silver Line at Boylston St.
Silver Line		New connections to Logan Airport terminals: Provide new transit connections to Logan Airport
Silver Line	X	Convert Washington St. Silver Line to trackless trolley or light rail and extend to Mattapan via Grove Hall
Silver Line		Build new trackless trolley tunnel under Stuart St. Convert E Line to trackless trolley and connect to Silver Line tunnel via this new tunnel.
Silver Line		Operate branch from Forest Hills to Dudley via Washington St.
Commuter Rail		Expand reverse commute options
Commuter Rail		Build new parking facility at interchange of Route 2 and I-495
Commuter Rail	X	Fairmount Line improvements/Indigo Line
Commuter Rail	X	Extend Providence Line to T. F. Green Airport (RI)
Commuter Rail	X	Reconstruct rights-of-way and extend service from Stoughton to New Bedford and Fall River via Taunton
Commuter Rail	X	Reconstruct tracks and extend service from Needham Junction to Millis
Commuter Rail	X	Extend service from Lowell to Nashua with stop at North Chelmsford
Commuter Rail	X	Extend service from Middleborough to Wareham
Commuter Rail	X	Extend service from Middleborough to Buzzards Bay or Hyannis
Commuter Rail	X	Extend service from Fitchburg to Gardner
Commuter Rail	X	Extend service from Forge Park to Milford
Commuter Rail	X	Extend service from Salem to Peabody
Commuter Rail		Institute a new line from Worcester to Providence
Commuter Rail		Institute a new line from Worcester to Haverhill
Commuter Rail		Build Central Mass. (Waltham to Berlin via Weston, Wayland, Sudbury, and Hudson) commuter rail or busway
Commuter Rail	X	Build Alewife commuter rail station
Commuter Rail	X	Build Allston/Brighton commuter rail station
Commuter Rail	X	Build commuter rail station at Riverside and intermodal transfer facility between commuter rail and Green Line
Commuter Rail	X	Build regional commuter rail station on I-495 in MetroWest area
Commuter Rail	X	Build regional commuter rail station on I-495 in Littleton area
Commuter Rail		Purchase hybrid bus-train vehicles that would have both steel and rubber wheels to operate on Framingham-Worcester Line
Commuter Rail	X	Make improvements to the Foxborough commuter rail station to accommodate regular commuting trips, and open stadium parking facilities to park-and-ride customers
Commuter Rail		Connect the Fairmount Line to the Red Line at Mattapan
Commuter Rail	X	North-south rail link: Construct a commuter rail tunnel connecting the North Side and South Side networks with stops at North Station, South Station, and possibly an intermediate location
Commuter Rail	X	Build a rail line from Framingham to Leominster via Northborough and Southborough
Commuter Rail		Operate service from Worcester to North Station via Cambridge over the Grand Junction line, with stops at BU, MIT and East Cambridge

Universe of Transit Expansion Projects for the 2025 Plan Build Scenario

Service	Screened by PMT	Project
Commuter Rail		Commuter rail "Inner Ring": Melrose to Winchester
Commuter Rail		Extend Newburyport trains to Kittery, Maine
Commuter Rail	X	Extend commuter rail from Haverhill to Plaistow, NH
Commuter Rail		Commuter rail from Framingham to Sudbury Center
Commuter Rail		Extend commuter rail from Worcester to Springfield
Commuter Rail		Restore Saugus Branch from Malden to Lynn via Saugus
Commuter Rail		Operate service from Boston to Route 1 in Peabody (branch off of Haverhill Line at Wakefield)
Commuter Rail	X	Operate to Danvers (branch from Salem)
Commuter Rail	X	Add South Salem stop
Commuter Rail	X	Add a new station at Millbury on Framingham/Worcester Line
Commuter Rail		Add a station at Route 128 on the Needham Line
Commuter Rail		On the Worcester commuter rail line operate rapid-transit-style service with Diesel Multiple Unit cars (DMUs) from Route 128 to South Station with new stops at Newton Corner, Faneuil, Brighton Center, Allston, BU Central, and Kenmore
Commuter Rail		Build new spur from South Weymouth Station into old Air Base
Commuter Rail		Restore Randolph Branch
Commuter Rail		Build a station in West Acton on Fitchburg Line
Commuter Rail		Extend proposed Greenbush line from Scituate to Marshfield
Commuter Rail	X	Add a station on Fitchburg Line at Union Sq. Somerville
Commuter Rail	X	Build Greenbush branch of Old Colony rail service
Commuter Rail		New station on Fitchburg Line near Twin City Plaza on Cambridge/Somerville Line
Commuter Rail		Add a station at Route 128/Mass. Pike on the Framingham/Worcester line
Commuter Rail		Build a new commuter rail station on the Haverhill/Reading Line that would serve both Sullivan Station and the potential new Assembly Square Station
Commuter Rail		Build a commuter rail branch to Logan Airport
Commuter Rail		Extend commuter rail service from Cordage Park to Plymouth Center
Commuter Rail		Extend proposed Millis Line to Medway
Commuter Rail		Institute a new commuter rail line from Lowell to New Bedford
Commuter Rail		Institute a new commuter rail line from South Acton to Marlborough
Commuter Rail		Operate EMU commuter rail trains from Hynes Convention
Commuter Rail		Center to new convention center
Bus		Better downtown bus distribution: Expand the coverage of downtown stops for bus routes serving downtown
Bus		Build Central Mass. (Waltham to Berlin via Weston, Wayland, Sudbury, and Hudson) commuter rail or busway
Bus	X	Implement a network of local feeder bus services to MetroWest commuter rail stations
Bus	X	Implement a network of local feeder bus services from South Shore communities to Old Colony commuter rail stations
Bus	X	Improve feeder bus service to Fitchburg commuter rail station
Bus	X	Urban Ring: Construct a transit system following a circular route around the inner core. Phase I includes new

Universe of Transit Expansion Projects for the 2025 Plan Build Scenario

Service	Screened by PMT	Project
		conventional bus routes, and Phase II includes new bus rapid transit segments
Bus	X	Operate circumferential Route 128 bus service
Bus		Run feeder bus to Southborough commuter rail station
Bus		Run feeder bus to South Acton commuter rail station
Bus		New bus service from Framingham Exit 12 park-and-ride lot to T. F. Green Airport and Manchester Airport
Bus		Operate feeder buses to Mansfield commuter rail station
Bus		Build busway from Ruggles to Dudley
Bus		Run from Rhode Island to Fall River to connect with the proposed commuter rail line.
Bus		Run a jitney van loop from Forest Hills to Longwood Medical Area to Coolidge Corner
Bus	X	Extend Trackless Trolley #71 from Watertown to Newton Corner
Bus		Build a bus rapid transit line along the Saugus Branch
Bus		Run more express buses to Boston from Scituate, Cohassett, Norwell, Marshfield, and Hingham
Bus	X	Add 100 additional buses regionwide
Bus		Create HOV lanes on Route 128 for circumferential bus service
Bus	X	New busways to Alewife Station along heavily congested portions of Alewife Brook Parkway and Route 2
Bus		Build a surface busway along the Central Artery right of way
Bus		Intersuburban bus service
Boat	X	Build a ferry wharf at Russia Wharf (near South Station)
Boat		Additional commuter boats through Cape Cod Canal
Boat	X	High-speed ferry service from North Shore (Lynn/Salem) to Boston and the airport
Boat	X	Restore East Boston ferry
Boat	X	Improve ferry service from South Shore communities (Quincy, Hingham, Hull, Cohasset, and Scituate) to Boston. Improve ferry infrastructure as part of expansion
Boat		New ferry service Assembly Sq. Mall-World Trade Center
Systemwide and Miscellaneous		New "intercept stations" along highways: Build new stations with parking at locations where transit lines cross major highways
Systemwide and Miscellaneous		Build regional intermodal transportation centers
Systemwide and Miscellaneous		Light rail from Route 495 to Burlington
Systemwide and Miscellaneous		Rapid transit to Chelsea (no line specified)
Systemwide and Miscellaneous		Connect Telecom City to Urban Ring
Systemwide and Miscellaneous		Build light rail feeder lines to Framingham from Walpole, Milford, and Marlborough
Systemwide and Miscellaneous		Add an outer Urban-Ring from Harvard Sq. to Dudley via Allston and Brookline (Route 66 routing)
Systemwide and Miscellaneous		Add an outer Urban Ring along Route 128
Systemwide and Miscellaneous		Build light rail line from South Acton sSation to Maynard Center
Systemwide and Miscellaneous		Build light rail line in South Boston to replace #9 bus
Systemwide and Miscellaneous	X	Extend Silver Line from Dudley Station to Mattapan and Ashmont Stations
Systemwide and Miscellaneous	X	Extend Silver Line from Boylston Station to Kenmore Station via new subway under Stuart Street and operate two western branches: one to the Longwood Medical Area and one to Oak Square,

Universe of Transit Expansion Projects for the 2025 Plan Build Scenario

Service	Screened by PMT	Project
		Brighton via Allston Landing
Systemwide and Miscellaneous	X	Extend Silver Line from Convention Center to City Point via Summer Street and East Broadway
Systemwide and Miscellaneous	X	Need for more Rideshare and park and ride facilities
Monorails and Bullet Trains		North Station--South Station monorail
Monorails and Bullet Trains		Build a monorail system on a circumferential route along the I-495 right-of-way
Monorails and Bullet Trains		Build monorail along Saugus Branch railroad
Monorails and Bullet Trains		Build monorail in Needham parallel to Route 128 along with MBTA parking garage
Non-Motorized Modes		Build bikeways next to commuter rail lines
Non-Motorized Modes		Build bikeway from Alewife to Waltham Center
Non-Motorized Modes		Extend bikepath from Somerville to Lechmere

APPENDIX D

Project Ratings

Highway Project Ratings

Each highway project included in the Universe of Projects with a defined description was rated on its impact to ten of the twelve policies. The evaluation included three ratings – high, medium, and low. A matrix summarizing the evaluation of projects and an explanation of the rating system are found in this appendix.

Universe of Projects - Projects Included in the Recommended Plan

High: ●
Medium: ◑
Low: ○
N/A: Not Applicable

Project Name	Cost	Included in 2000-2025 Plan	Policy 1 - Support Land Uses	Policy 2 - Safety and Security	Policy 3 - Improve Mobility	Policy 4 - Minimize Pollution/Conserve Energy	Policy 5 - Improve Connections Among Modes	Policy 6 - Accessible System to All	Policy 7 - Sharing of Benefits/Burdens	Policy 8 - Preservation/Modernization of System	Policy 9 - Promote Public Involvement	Policy 10 - Strengthen Economic Opportunities	Policy 11 - Preserve Community Resources/Characte	Policy 12 - Efficient/Effective Financial Resources
Bedford , Crosby Drive	$3,500,000	X	○	◑	●	◑	N/A	N/A	N/A	●		●	◑	
Bedford & Burlington , Middlesex Turnpike	$12,500,000	X	○	◑	●	◑	N/A	N/A	N/A	●		●	◑	
Beverly to Peabody , Rte. 128 Capacity Improvements	$60,000,000	X	N/I	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Boston , East Boston Haul Road or the	$12,000,000	X	◑	◑	●	◑	●	N/A	●	●		◑	◑	
Boston to Newton , Double Stack Initiative	$20,000,000	X	N/A	◑	●	●	●	N/A	N/A	●		◑	◑	
Boston , Route 1A/Boardman Street Grade Separation	$8,500,000	X	N/A	●	●	●	N/A	N/A	◑	●		◑	◑	
Boston , Rutherford Avenue	$67,800,000	X	●	●	◑	◑	◑	N/A	N/A	◑		◑	●	
Canton , I-93/I-95 Interchange	$27,500,000	X	N/A	●	●	◑	●	N/A	N/A	●		◑	◑	
Canton , I-95 (NB)/Dedham Street Ramp	$3,000,000	X	N/A	◑	●	◑	●	N/A	N/A	●		◑	◑	
Concord and Lincoln , Route 2/Crosby's Corner	$15,000,000	X	N/A	●	●	●	N/A	N/A	N/A	●		◑	◑	
Concord , Concord Rotary	$15,000,000	X	○	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Danvers & Peabody , Route 1/114 Corridor Improvements	$40,000,000	X	○	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Everett & Medford , Revere Beach Parkway	$80,000,000	X	◑	●	●	◑	N/A	N/A	N/A	●		●	◑	
Everett, Malden & Medford , Telecom City Boulevard	$13,000,000	X	◑	◑	◑	◑	N/A	N/A	N/A	◑		●	◑	
Framingham to Worcester , Double Stack Initiative	$8,000,000	X	N/A	◑	●	●	●	N/A	N/A	●		◑	◑	
Framingham , Route 126/135 Grade Separation	$50,000,000	X	●	●	◑	●	◑	N/A	◑	●		●	●	
Framingham , Rte. 9/Rte. 126 Interchange	$15,000,000	X	N/A	◑	●	◑	N/A	N/A	N/A	●		◑	◑	
Hanover , Route 53	$4,000,000	X	○	◑	●	◑	N/A	N/A	N/A	●		◑	◑	
Hingham and Norwell , Route 53/228	$2,500,000	X	N/A	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Lynnfield to Reading , Rte. 128 Capacity Improvements	$50,000,000	X	N/I	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Malden & Revere , Route 1 Improvements	$33,600,000	X	◑	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Marlborough , I-495/I-290/Route 85 Interchange	$28,000,000	X	N/A	●	◑	◑	N/A	N/A	N/A	●		◑	◑	
Natick & Wellesley , Double Stack Initiative	$20,000,000	X	N/A	◑	●	●	●	N/A	N/A	●		◑	◑	
Newton & Needham , Needham Street/Highland Avenue	$6,600,000	X	◑	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Quincy, Burgin Parkway	$18,000,000	X	◑	●	●	◑	◑	N/A	N/A	●		●	◑	
Quincy , Quincy Center Concourse, Phase 2	$6,000,000	X	N/A	◑	●	◑	N/A	N/A	N/A	●		◑	◑	
Reading & Woburn , I-93/I-95 Initiative	$25,000,000	X	N/I	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Revere , Mahoney Circle Grade Separation	$25,000,000	X	●	●	●	●	N/A	N/A	●	●		◑	◑	
Revere , Route 1/Route 16 Interchange	$3,900,000	X	N/A	●	●	◑	N/A	N/A	●	●		◑	◑	
Revere , Route 1A/Route 16 Connection	$39,600,000	X	●	◑	●	◑	N/A	N/A	●	●		◑	◑	
Salem , Boston Street	$2,000,000	X	◑	●	◑	◑	N/A	N/A	N/A	●		◑	◑	
Salem , Bridge Street	$3,000,000	X	●	●	●	◑	●	N/A	N/A	●		◑	◑	
Somerville , I-93/Mystic Avenue Interchange	$50,000,000	X	●	●	●	◑	N/A	N/A	N/A	●		●	◑	
Weymouth to Duxbury , Route 3 South Additional Lanes	$180,000,000	X	○	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Weymouth , Naval Air Station Access Improvements	$74,700,000	X	N/I	●	●	◑	◑	N/A	N/A	●		●	◑	
Weymouth , Route 18	$16,000,000	X	●	●	●	◑	◑	N/A	N/A	●		◑	◑	
Wilmington , I-93/Ballardvale Street Interchange	$15,000,000	X	N/A	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Wilmington , I-93/Route 129 Interchange	$15,000,000	X	N/A	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Woburn , New Boston Street Bridge	$2,000,000	X	◑	◑	●	◑	●	N/A	N/A	◑		◑	◑	

Note: Policies 9 and 12 are policies of the MPO but are not aplicable for rating individual projects

Universe of Projects - Projects with Descriptions Not Included in the Recommended Plan

High: ●
Medium: ◑
Low: ○

Project Name	Cost	Included in 2000-2025 Plan	Policy 1 - Support Land Uses	Policy 2 - Safety and Security	Policy 3 - Improve Mobility	Policy 4 - Minimize Pollution/Conserve Energy	Policy 5 - Improve Connections Among Modes	Policy 6 - Accessible System to All	Policy 7 - Sharing of Benefits/Burdens	Policy 8 - Preservation/Modernization of System	Policy 9 - Promote Public Involvement	Policy 10 - Strengthen Economic Opportunities	Policy 11 - Preserve Community Resources/Characte	Policy 12 - Efficient/Effective Financial Resources
Acton to Lexington , Route 2 Capacity Improvements			○	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Arlington & Cambridge , Route 2/Route 16 Interchange			●	●	●	◑	◑	N/A	N/A	●		◑	◑	
Bedford , Wiggins Avenue Extension			○	◑	◑	◑	N/A	N/A	N/A	◑		◑	◑	
Boston to Braintree , I-93 Capacity Improvements			N/A	●	●	◑	◑	N/A	◑	●		◑	◑	
Boston , Back Bay Turnpike Exit	$100,000,000		◑	◑	◑	◑	N/A	N/A	N/A	◑		●	○	
Braintree , Route 3/Union Street Safety Improvements [Town of Braintree]			N/A	●	◑	◑	◑	N/A	N/A	●		◑	◑	
Canton to Foxborough , I-95 Capacity Improvements			○	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Canton , East/West Connector Road	$7,200,000		○	◑	●	◑	N/A	N/A	N/A	◑		◑	○	
Gloucester , Gloucester Rotary [NSTF sub-region]			N/A	●	◑	◑	N/A	N/A	N/A	●		◑	◑	
Hopkinton , I-495/South Street New Interchange	$20,000,000		○	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Hudson , Washington St. Widening			○	◑	●	◑	N/A	N/A	N/A	●		◑	◑	
Littleton to Wrentham , I-495 Capacity Improvements			○	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Lynnfield to Saugus , Route 1 Capacity Improvements			◑	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Marlborough , Boundary St./Goddard Rd. Connection	$2,500,000		○	◑	◑	◑	N/A	N/A	N/A	◑		◑	◑	
Natick, Route 9/Oak Street Improvements [TPPC]			N/A	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Newton, New Ramp from I-95 to Riverside Station [TPPC]			◑	◑	●	◑	●	N/A	N/A	●		◑	◑	
Newton, Route 9/Chestnut Street [TPPC]			N/A	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Norwood , Route 1/Everett Street [TRIC sub-region]			N/A	●	●	◑	◑	N/A	N/A	●		◑	◑	
Randolph to Raynham , Route 24 Capacity Improvements			○	●	●	◑	N/A	N/A	N/A	●		◑	◑	
Salem , Commercial St./Tremont St.	$500,000		◑	◑	◑	◑	N/A	N/A	N/A	◑		◑	◑	
Somerville to Woburn , I-93 Capacity Improvements			N/A	●	●	◑	◑	N/A	N/A	●		◑	◑	
Somerville , Depress I-93 [Everett 11/13/01]			●	◑	◑	◑	N/A	N/A	N/A	◑		◑	◑	
Wellesley to Woburn , Route 128 Capacity Improvements			N/A	●	●	◑	N/A	N/A	N/A	●		◑	◑	

DATE: March 18, 2003

TO: Planning and Programming Committee

FROM: David Mohler
Anne McGahan

RE: Tying Policies to Highway Projects

The Planning and Programming Committee has decided to use the project matrix as one of the inputs for assessing proposed projects during the development of the 2004 Regional Transportation Plan. This matrix, which was first used last year during the development of the 2002 Plan Update, assesses proposed projects for consistency with 10 broad policies.

Per the committee's instructions, staff reassessed the proposed highway projects included in the Plan Update. This reassessment resulted in many discrepancies from the ratings performed for the Plan Update, even though the policies and the projects are unchanged. Staff, therefore, performed a third assessment, limiting our review to the identified discrepancies. The resulting staff recommendations were presented at the Planning and Programming Committee meeting on March 6th. The committee requested documentation of the process by which staff assessed projects.

This memorandum documents the process by which staff used the policies to assess projects. Most of this memorandum is a listing of the policies. Staff comments are indicated below each sub-policy. The way staff used the policy to assess projects is shown in a box after each policy.

Boston Region MPO Regional Transportation Plan Policies

Policy 1: Promote transportation projects that support state, regional and local land use policies.

Integrating transportation and land use policies can result in more efficient use of the regional transportation system, bringing jobs, housing, shopping and services closer together, and reducing sprawl.

To accomplish this policy, the Boston Region MPO will:

A. Consider both existing development and densities and any adopted state, regional and local plans in transportation decision making and seek to develop transportation plans that are consistent with them. Priority will be given to projects in areas identified in local and regional plans as being suitable for concentrated development.

Staff Comment: *This sub-policy requires the consideration of existing development and densities, as well as land use plans, in determining whether a project supports the MPO's land use policy. It also speaks to the importance of local as well as regional plans for assessing the appropriateness of concentrated developments.*

B. Solicit the input of environmental, community, economic development and other appropriate agencies on MPO certification documents to promote the integration of transportation with these interests.

Staff Comment*: This sub-policy is process oriented and cannot be used to assess projects in the matrix. The MPO would, of course, consider at the appropriate time during Plan development any project-specific comments received from the noted entities*.

C. Consider the impact of transportation projects on existing and future land use.

Staff Comment*: This sub-policy again speaks to the need to consider existing conditions, as well as future land uses.*

D. Consider the appropriate use and maintenance of transportation rights-of-way to maximize public benefits.

Staff Comment*: This sub-policy is concerned with reserving transportation rights-of-way, which are a valuable public resource.*

E. Encourage transportation investments that support transit-oriented designs, and increased potential for walking and bicycling.

Staff Comment: *This sub-policy provides MPO support for transit-oriented development and bicycle and pedestrian integration in planned projects.*

Based upon the above interpretation of the 5 land use sub-policies, staff assessed the projects for consistency with the MPO land use policy as follows:

- **A project was rated high if it could facilitate development in an area that has the appropriate density and existing transportation infrastructure, or if it is clearly tied to a planned transit-oriented development.**

- **A project was rated medium if it is needed to serve the existing land use and there is no potential for causing a significant amount of undesirable growth in the area.**

- **A project was rated low if it has the potential of causing a significant amount of undesirable growth.**

Policy 2: Improve safety and security for all transportation system users.

Travelers should be confident of a safe and secure trip. Safety can be enhanced through careful attention to design, redesign, and upgrading of facilities. Operational safety can be enhanced through timely and effective maintenance.

To accomplish this, the Boston Region MPO will:

A. Support designs, projects, and programs that accommodate safe travel for all system users throughout the transportation network, regardless of mode. This includes designs that encourage bicyclists, motorists, transit riders and pedestrians to share the transportation network safely.

Staff Comment: *This sub-policy commits the MPO to considering the safety of all users in any proposed project.*

B. Work with state agencies and communities to support design concepts that ensure that consideration of operational efficiency, comfort, safety and convenience of the motorist are balanced with the needs of the communities, the environment, pedestrians, and bicyclists.

Staff Comment: *This sub-policy balances the needs of motorists with those using other modes, reaction to the perception that safety is used as an inappropriate justification for over-designing proposed projects, and needs of those passing through an area with those who live there.*

C. Support maintenance and operations of system infrastructure to provide for safety.

Staff Comment: *This policy ties operation and maintenance of the existing system to the MPO's safety policy.*

Based upon the above interpretation of the 3 safety sub-policies, staff assessed the projects for consistency with the MPO safety policy as follows:

- **A project was rated high if it was proposed in direct response to an identified safety hazard or if it included significant safety components.**
- **A project was rated medium if it was relatively neutral on this issue: it did not address an identified safety hazard, did not include significant safety components, and did not cause a degradation of safety for system users.**
- **A project was rated low if it caused a degradation of safety for system users.**

Policy 3: Improve transportation mobility for people and freight.

Improved mobility requires access to the transportation system and the availability of safe, reliable, and convenient travel options so that users can choose the services that best fit their needs.

To accomplish this policy, the Boston Region MPO will:

A. Support projects that increase the availability of transportation options.

Staff Comment: *This sub-policy favors projects that increase mode choices.*

B. Encourage projects that reduce reliance on single-occupant vehicles.

Staff Comment*: This sub-policy favors projects that reduce automobile demand or increase mode choices (except projects that expand general purpose highway capacity).*

C. Support projects and programs that improve transit service by making it faster, more reliable, and more convenient.

Staff Comment*: This policy supports transit service enhancements as a means of increasing regional mobility.*

D. Support transit services, including water transit, that increase and complement connections among transit services and communities.

Staff Comment*: This policy supports transit service connections as a means of increasing regional mobility.*

E. Assist agencies and communities in planning and implementing projects that provide safe and convenient bicycle and pedestrian connections to transit routes, between activity centers, and across communities.

Staff Comment*: This policy supports bicycle and pedestrian projects as a means of increasing regional mobility.*

F. Support programs that improve reverse commute options.

Staff Comment*: This policy supports reverse commute options as a means of increasing regional mobility.*

G. Plan and support transportation system management projects and programs that improve the operation of existing services, such as improved signal systems, bus rapid transit, bus lanes and traffic signal preemption, and incident management programs.

Staff Comment*: This policy supports operational enhancements to the existing system as a means of increasing regional mobility.*

H. Encourage the use of new technology and programs, including highway and transit Intelligent Transportation System programs and bus rapid transit, to improve the operation of the transportation system, improve safety, and reduce congestion.

Staff Comment*: This policy supports ITS and other technology projects as a means of increasing regional mobility.*

I. Support projects that expand transportation system capacity in areas that are identified as problems in the Boston Region Congestion Management System and as dictated by sound fiscal management. Transit capacity may be expanded by increasing service frequency, expanding vehicle capacity, or expanding the system. Highway capacity may be increased by improving interchanges or adding HOV lanes. Adding capacity by building general-purpose lanes should be considered only when no demonstrably better solution such as public transportation can be found.

Staff Comment: *This policy limits MPO support for capacity expansions to areas of congestion identified through the CMS process. It also precludes MPO support for additional general purpose lanes unless "no demonstrably better solution can be found."*

J. Expand commuter rail parking where necessary and practical.-

Staff Comment: *This policy supports the expansion of commuter rail parking as a means of increasing regional mobility.*

Based upon the above interpretation of the 10 mobility sub-policies, staff assessed the projects for consistency with the MPO mobility policy as follows:

- **A project was rated high if its primary purpose is to add a mode choice, provide a needed operational improvement on the existing system, or provide a connection to transit or between transit modes.**
- **A project was rated medium if its effect on mobility is neutral or if it only incidentally impacts mobility as a means to addressing another regional need (e.g., safety).**
- **A project was rated low if it significantly decreases mobility through a reduction in transit service or highway lanes or limits or removes current modal connections.**

SPECIAL NOTE: STAFF MADE NO EFFORT TO DETERMINE WHETHER FOR ANY PARTICULAR HIGHWAY CAPACITY PROJECT, A "DEMONSTRABLY BETTER SOLUTION CAN BE FOUND."

Policy 4: Minimize transportation-related pollution of the environment and promote energy conservation.

This plan recognizes that reduced reliance on single-occupant vehicles and use of alternative fuel vehicles promote long-term air quality, reduced energy consumption and natural resource protection.

To accomplish this policy, the Boston Region MPO will:

A. Place a priority on identifying and evaluating environmental impacts in the transportation planning process.

Staff Comment: *This sub-policy is process oriented and was not used to assess projects in the matrix, although the assessment of projects for compliance with the MPO's environmental policy is one of the methods of complying with this sub-policy.*

B. Encourage projects and programs that increase the use of low-polluting fuels and efficient engine technology in vehicle fleets and transit vehicles.

Staff Comment: *This sub-policy favors the use of alternative fuel vehicles.*

C. Encourage the design and construction of facilities that assure that materials used in operations and maintenance will not have detrimental impacts on soil and water, and will minimize light and noise pollution.

Staff Comment: *This sub-policy is process oriented and was not used to assess projects in the matrix.*

D. Encourage the design, construction, and operation of facilities and services that promote energy efficiency and air quality.

Staff Comment: *This sub-policy favors projects that result in energy efficiencies and improved air quality.*

E. Plan and fund programs to reduce demand for transportation services and facilities, including ridesharing and employer-based congestion reduction programs.

Staff Comment: *This project favors Transportation Demand Management projects that reduce the need for transportation services.*

Based upon the above interpretation of the 5 pollution sub-policies, staff assessed the projects for consistency with the MPO pollution policy as follows:

- **A project was rated high if it results in improved air quality (either through regional improvements or localized impacts), includes the use of alternative fuel vehicles as an integral component of the project, or is aimed at reducing the need for transportation services.**
- **A project was rated medium if its impact on air quality is neutral.**
- **A project was rated low if it is projected to have a negative impact on air quality.**

Policy 5: Provide and improve connections among transportation modes.

This Transportation Plan promotes a multimodal, comprehensive approach to transportation, with the various modes complementing each other. Investment choices should be influenced by how an improvement to a single transportation mode can make the entire system work better.

To accomplish this policy, the Boston Region MPO will:

A. Work to improve coordination among the local, regional, and state jurisdictions that own and operate the region's transportation system to better provide for local and regional transportation needs.

Staff Comment: *This sub-policy is process oriented and was not used to assess projects in the matrix.*

B. Fund projects, such as vehicle and bicycle parking expansion, that provide additional capacity at intermodal facilities.

Staff Comment: *This sub-policy favors projects that provide additional capacity at intermodal facilities.*

C. Support projects that facilitate ease of transfer between modes, including improved fare collection systems and transit pass programs, and encourage transit schedules that promote timely transfers between services.

Staff Comment: *This sub-policy favors operational projects that improve transfers between transit modes.*

D. Fund systems that provide intermodal information on incidents, alternative routes, parking availability, and transit schedules.

Staff Comment: *This sub-policy supports the funding of real-time transportation information systems.*

E. Support projects and programs that improve access to transportation facilities.

Staff Comment: *This project favors projects, including highway projects, that improve access to transportation facilities, for all modes.*

Based upon the above interpretation of the 5 connectivity sub-policies, staff assessed the projects for consistency with the MPO connectivity policy as follows:

- **A project was rated high if it adds capacity to an intermodal facility or improves access to such a facility, improves transfers between transit modes, or provides real-time information as an integral component of the project.**
- **A project was rated medium if its impact on connectivity is neutral or if it only incidentally impacts modal connectivity.**
- **A project was rated low if it significantly degrades an existing intermodal connection.**

Policy 6: Provide a transportation system that is accessible to all people.

The transportation system should provide access to transportation options for all people regardless of physical limitation, economic status, age or ethnicity.

To accomplish this policy, the Boston Region MPO will:

A. Work with local, regional, and state jurisdictions to identify and assess structural and operational barriers to mobility for transportation disadvantaged populations and seek to address them through a comprehensive program of construction, maintenance and operational improvements.

Staff Comment: *This sub-policy commits the MPO to a comprehensive program of accessibility improvements for "transportation disadvantaged populations."*

B. Seek to provide better access for all to transportation throughout the region, including for our youth and for our elderly and disabled users.

Staff Comment: *This sub-policy favors projects that improve transportation access for the elderly, the young and the disabled.*

Based upon the above interpretation of the 2 accessibility sub-policies, staff assessed the projects for consistency with the MPO accessibility policy as follows:

- **A project was rated high if it includes ADA improvements as an integral component of the project or if it significantly improves transit service for the young or the elderly.**

- **A project was rated medium if its impact on transportation accessibility for the elderly, the young or the disabled is neutral.**

- **A project was rated low if it degrades transportation accessibility for the elderly, the young, or the disabled.**

Policy 7: Promote the equitable sharing of the transportation system's benefits and burdens.

All users and communities should be treated fairly in the provision of transportation services; should not be inequitably burdened by impacts from transportation projects; and should be invited to participate in transportation decision-making.

To accomplish this policy, the Boston Region MPO will:

A. Adopt measures of Environmental Justice for the region.

Staff Comment: *This sub-policy is process oriented and was not used to assess projects in the matrix.*

B. Use these Environmental Justice measures as an evaluation tool in planning and programming.–

Staff Comment: *This sub-policy commits the MPO to using its environmental justice measures in project selection.*

C. Apply planning resources to the resolution of identified environmental justice issues.

Staff Comment: *This sub-policy is process oriented and cannot be used to assess projects in the matrix.*

Based upon the above interpretation of the 3 environmental justice (EJ) sub-policies, staff assessed the projects for consistency with the MPO EJ policy as follows:

- **A project was rated high if it addresses an existing burden in an EJ community by providing additional benefits from existing transportation infrastructure, if it removes an existing burden in an EJ community, or if it primarily benefits an EJ community.**

- **A project was rated medium if it does not primarily benefit an EJ community and does not inordinately burden an EJ community.**

- **A project was rated low if the burden imposed on an EJ community is significantly greater than the associated benefits accruing to that community.**

Policy 8: Emphasize the preservation and modernization of the existing transportation system.

Past investment in transportation facilities in the Boston region has resulted in a system that people and businesses rely on every day. Protecting that investment by preserving and upgrading facilities and services that meet a demonstrated need is a top priority.

To accomplish this policy, the Boston MPO will:

A. Put priority on projects that maintain and modernize existing infrastructure.

Staff Comment*: This sub-policy commits the MPO to funding maintenance and modernization projects as a priority.*

B. Promote public ownership and use of existing rights-of-way necessary for transportation needs consistent with statutory authority or other obligations providing for disposition of property.

Staff Comment*: This sub-policy is process oriented and was not used to assess projects in the matrix.*

Based upon the above interpretation of the 2 preservation and modernization sub-policies, staff assessed the projects for consistency with the MPO preservation and modernization policy as follows:

- **A project was rated high if it modernizes the existing transportation system by addressing an MPO-identified safety or mobility problem by improving a facility that is operating significantly below accepted design standards.**
- **A project was rated medium if it does not address an MPO-identified safety or mobility problem.**
- **A project was rated low if it makes an identified safety or mobility problem worse.**

Policy 9: Promote public involvement in all phases of transportation planning and design.

All users of the transportation system should have a voice in the transportation planning process. Public participation will continue through the Regional Transportation Advisory Council (Advisory Council), the MPOs advisory committee, and through other, complementary avenues.

To accomplish this policy, the Boston Region MPO will:

A. Adopt, in cooperation with Advisory Council, a new MPO Public Participation Plan that provides all users of the transportation system with the opportunity to participate in the transportation planning process.

B. Use extensive and effective means to reach users, including meetings and various media, always presenting information in a clear, jargon-free format.

C. Work to simplify the project review process by establishing review timelines and deadlines, providing updated status information regularly, and working with implementing agencies to ensure that all communities understand the process.

D. Continue to work with the Advisory Council in the development of all MPO documents, and support Advisory Council's work of bringing the public's views to MPO decision making.

E. Reach out to under-represented persons and groups to ensure that decisions are made through an open and participatory process.

Staff determined that this policy regarding public involvement was entirely process-oriented and not suited to the assessment of individual projects.

Policy 10: Strengthen the economic opportunities in the Boston region through transportation investments specifically taking into account areas targeted for economic development by state, regional and local plans.

The transportation system is fundamental to and intertwined with economic activity.
To accomplish this policy, the Boston Region MPO will:

A. Put priority on transportation investments related to existing centers of economic activity; or to areas with adequate water and sewer infrastructure; or to areas targeted for economic development.

Staff Comment: *This sub-policy prioritizes transportation projects that serve existing employment areas or town centers, that help target future growth consistent with the MPO's land use policy, or that serve areas targeted for economic development.*

B. Coordinate available data on freight movements in the Boston region in order to inform MPO decisions on infrastructure investments.

Staff Comment: *This sub-policy is process oriented and cannot be used to assess projects in the matrix.*

C. Encourage development of a comprehensive plan for freight movement that includes an evaluation of: freight infrastructure needs and access to intermodal

facilities (air, road, rail, and water), and consider impacts on neighborhoods and the environment.

Staff Comment: *This sub-policy is process oriented and cannot be used to assess projects in the matrix.*

Based upon the above interpretation of the 3 economic development sub-policies, staff assessed the projects for consistency with the MPO economic development policy as follows:

- **A project was rated high if serves an existing employment area or town center, targets future growth consistent with the MPO's land use policy, or serves a state-designated revitalization area.**
- **A project was rated medium if it does not serve an economic growth area as defined by this policy and does not contravene the MPO's targeted growth policy.**
- **A project was rated low if it does not serve an economic growth area defined by this policy and has the potential to facilitate economic growth that would contravene the MPO's targeted growth land use policy.**

Policy 11: Support the preservation of community resources and character in the transportation planning process.

To accomplish this policy, the Boston Region MPO will:

A. Encourage and support transportation enhancement projects to preserve and improve the natural and built environment.

Staff Comment: *This sub-policy commits the MPO to support transportation enhancement projects.*

B. Support the use of traffic calming when appropriate.

Staff Comment: *This sub-policy commits the MPO to support the appropriate use of traffic calming techniques.*

C. Work with state agencies and communities to support design concepts for roads that balance the needs of users of the facilities with the function and character of surrounding land uses, including scenic roads and historic areas.

Staff Comment*: This sub-policy requires the MPO to consider community character in its project assessment process.*

Based upon the above interpretation of the 3 community character sub-policies, staff assessed the projects for consistency with the MPO community character policy as follows:

- **A project was rated high if it is clearly designed to improve or maintain the existing community character, including using traffic-calming where appropriate and providing streetscape improvements or other enhancements as an integral component of the project.**

- **A project was rated medium if it is located within an area where a transportation project's impact on community character is not a significant concern or if the particular project's impact is unclear at this time.**

- **A project was rated low if it negatively impacted an existing community character.**

Policy 12: Efficiently and effectively secure and apply financial resources for the maintenance, modernization, and appropriate expansion of the regional transportation system.

The Boston MPO has an obligation to provide maximum transportation benefit from its available financial resources and to explore and identify innovative financing options for transportation projects.

To accomplish this policy, the Boston Region MPO will:

A. Work to identify and acquire new revenue for transportation.

B. Explore and identify innovative funding sources including revenue sharing among communities and peak period pricing.

C. Promote new public-private partnerships as a way to provide needed services.

D. Work with implementing agencies, communities and project proponents to identify and adopt policies, procedures and information systems to estimate and contain project costs.

Staff determined that this policy regarding financial resources was entirely process oriented and not suited to the assessment of individual projects.

Transit Project Ratings

A list of the transit expansion projects broken down by mode (rapid transit, bus and trackless trolley, commuter rail and boat project) and their overall evaluations is provided in this appendix. The evaluation included a high, medium, and low rating system.

OVERALL RAPID TRANSIT PROJECT EVALUATION

Project Description	Type	Utilization	Mobility	Cost Effective	Air. Quality	Service Quality	Econ/Land Use Impacts	Environ. Justice	Total
Blue-Red Connector	Line Ext.	◗	◗	●	◗	◗	●	◗	◗
Convert Dudley/ Boylston section of Silver Line to light rail	Line Ext.	❍	❍	❍	❍	◗	●	●	❍
Extend Blue Line from Bowdoin to West Medford	Line Ext.	◗	◗	◗	◗	◗	●	●	◗
Extend Blue Line from Lynn to Salem	Line Ext.	●	◗	◗	●	❍	◗	◗	◗
Extend Blue Line from Wonderland to Lynn	Line Ext.	●	◗	◗	●	◗	●	●	●
Extend Green Line to West Medford	Line Ext.	◗	◗	◗	◗	◗	◗	●	◗
New Green Line Needham Branch	Line Ext.	❍	❍	❍	❍	◗	❍	❍	❍
Orange Line No. Ext. From Oak Grove to Reading/Route 128	Line Ext.	◗	❍	❍	◗	❍	❍	❍	❍
Orange Line So. Ext. From Forest Hills to Rt 128 Via Hyde Park	Line Ext.	❍	❍	❍	◗	◗	◗	◗	❍
Orange Line So. Ext. From Forest Hills to W. Roxbury/Needham	Line Ext.	❍	❍	❍	❍	❍	❍	◗	❍
Red Line extension to Weymouth	Line Ext.	◗	❍	❍	◗	❍	●	❍	❍
Red Line NW Ext. from Alewife to Rt 128	Line Ext.	❍	❍	❍	◗	◗	❍	❍	❍
Restore Green Line service between Heath St & Arborway	Line Ext.	❍	❍	◗	❍	●	●	◗	◗
Silver Line East Ext. to City Point	Line Ext.	❍	❍	●	◗	◗	●	❍	◗
Silver Line Phase III: South Station-Boylston Connector	Line Ext.	●	●	◗	◗	◗	●	●	●
Silver Line So. Ext. to Ashmont & Mattapan	Line Ext.	◗	◗	●	◗	●	●	●	●
Silver Line West Exts. to Allston & Longwood Medical Area	Line Ext.	●	◗	◗	◗	◗	●	◗	◗
Urban Ring Phase II	Line Ext.	●	●	●	●	●	●	●	●
Urban Ring Phase III	Line Ext.	●	●	●	●	●	●	●	●
Construct Orange Line station at Assembly Sq	New Station	❍	❍	●	◗	❍	●	◗	◗
Wonderland Connector	New Station	❍	❍	◗	◗	❍	●	❍	❍

High priority ●
Medium priority ◗
Low priority ❍

Source: Program for Mass Transportation

OVERALL BUS/TRACKLESS TROLLEY PROJECT EVALUATION								
Project Description	**Type**	**Utilization**	**Mobility**	**Cost Effective**	**Air. Quality**	**Service Quality**	**Environ. Justice**	**Total**
Build new busways to Alewife Station	Line Ext./ New Line	❍	❍	●	●	◗	❍	◗
Extend Trackless Trolley #71 from Watertown to Newton Corner	Line Ext./ New Line	❍	❍	●	◗	❍	❍	❍
Route 128 Circumferential Bus Service	Line Ext./ New Line	◗	●	❍	❍	❍	❍	❍
Suburban Commuter Rail Feeder Bus Services	Line Ext./ New Line	◗	●	◗	◗	●	●	●
Urban Ring Phase I	Line Ext./ New Line	●	◗	❍	❍	●	●	●

High priority ●
Medium priority ◗
Low priority ❍

Source: Program for Mass Transportation

OVERALL COMMUTER RAILROAD PROJECT EVALUATION

Project Description	Type	Utilization	Mobility	Cost Effective	Air Quality	Service Quality	Econ/Land Use Impacts	Environ. Justice	Total
Build CRR spur from Framingham to Leominster	Line Ext.	●	●	❍	❍	❍	●	◗	◗
Build CRR spur from Salem to Danvers	Line Ext.	◗	●	◗	◗	❍	❍	◗	●
CRR branch from existing Old Colony lines to Greenbush	New Line	●	●	◗	◗	❍	❍	❍	●
CRR to Millis	Line Ext.	●	●	◗	◗	❍	❍	❍	◗
CRR to New Bedford/Fall River	Line Ext.	●	●	◗	◗	❍	◗	◗	●
Extend CRR from Providence to T.F. Green (RI)	Line Ext.	◗	●	◗	◗	◗	❍	❍	◗
Extend CRR from Fitchburg to Gardner	Line Ext.	❍	●	❍	❍	❍	●	◗	◗
Extend CRR from Forge Park to Milford	Line Ext.	◗	●	◗	◗	❍	❍	◗	◗
Extend CRR from Haverhill to Plaistow	Line Ext.	●	❍	●	●	❍	❍	❍	◗
Extend CRR from Lowell to Nashua	Line Ext.	●	●	◗	●	❍	❍	❍	◗
Extend CRR from Middleborough to Wareham	Line Ext.	◗	●	❍	◗	❍	◗	❍	◗
Extend passenger rail service from Wareham to Hyannis	Line Ext.	◗	❍	❍	●	❍	❍	❍	❍
North-South Rail Link	Line Ext.	●	◗	◗	◗	◗	●	◗	●
Operate full time service to Foxboro Sta.	Line Ext.	❍	◗	❍	◗	❍	❍	❍	❍
Operate high-frequency Riverside - South Station CRR	Line Ext.	❍	❍	❍	❍	❍	◗	❍	❍
Operate high-frequency Riverside - JFK/Umass CRR	Line Ext.	◗	❍	❍	❍	❍	◗	◗	❍
Operate high-frequency Readville - Allston Landing CRR	Line Ext.	❍	◗	❍	❍	❍	●	●	◗
Add station at Millbury on the Framingham/Worcester line	New Station	❍	◗	●	◗	❍	●	❍	◗
Add a station at So. Salem on Rockport/Newburyport line	New Station	❍	◗	●	●	❍	◗	◗	◗
Build a new Allston/ Brighton CRR station	New Station	❍	◗	◗	◗	❍	●	●	◗
Build a new CRR station on the Fitchburg Line at Union Sq, Somerville	New Station	❍	◗	●	◗	❍	●	●	●
Build a regional CRR station along Rt 2 west of I-495	New Station	❍	❍	❍	◗	❍	❍	❍	❍
Build regional CRR station on I-495 in Metrowest	New Station	◗	❍	◗	●	❍	❍	❍	◗
Connect Fitchburg CRR w/ Red Line at Alewife	New Station	❍	❍	◗	◗	◗	●	❍	◗
Fairmount Line Imps.	New Station	◗	●	◗	❍	●	●	●	●
New CRR station at Riverside	New Station	❍	❍	●	◗	◗	❍	❍	◗

High priority ●
Medium priority ◗
Low priority ❍

Source: Program for Mass Transportation

OVERALL BOAT PROJECT EVALUATION

Project Description	Type	Utilization	Mobility	Cost Effective	Air Quality	Service Quality	Economic/ Land Use Impacts	Environ. Justice	Total
Russia Wharf/ South Station	Line Extension/ New Line	◗	◗	●	❍	◗	●	❍	●
High-Speed Ferry Service From the North Shore to Boston and the Airport	Line Extension/ New Line	◗	❍	❍	❍	❍	◗	◗	❍
Restore East Boston ferry	Line Extension/ New Line	❍	❍	◗	❍	❍	●	●	◗
Improved Ferry Service From South Shore Communities (Quincy, Hingham and Hull) to Boston.	Frequency Improvement	●	◗	◗	❍	❍	❍	◗	◗

High priority ●
Medium priority ◗
Low priority ❍

Source: Program for Mass Transportation

APPENDIX E

Socioeconomic Forecasts

Socioeconomic Forecasts 2003

For use in the Regional Transportation Plan

MAPC

Metropolitan Area Planning Council
60 Temple Place
Boston, MA 02111

Socioeconomic Forecasts 2003

For use in the Regional Transportation Plan

Holly St. Clair, Manager of Metro Data Center
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Metropolitan Area Planning Council
60 Temple Place
Boston, MA 02111

The Metropolitan Area Planning Council (MAPC) has recently completed population, employment and household projections for 164 communities in the Boston regional model area. These totals will be included in the Boston metropolitan area regional transportation plan, which requires that we produce numbers to the year 2025. Standard trends methodologies were used to calculate the “Baseline” projections; they are based on historical trends in each of the communities in the region over the last 5 to 20 years. Second, we developed the “Targeted Growth” scenario for MAPC communities, which changes the Baseline population and employment projections to better represent an alternative future land-use scenario, a future scenario that represents a long-term goal that we are using the transportation plan to help us achieve. These population and employment numbers were then sent out to all communities for comment. Final numbers were produced incorporating community feedback. Details on the methodologies are described below.

I. Baseline Forecasts Methodologies

Population

Data Requirements

The following statistical information was required for the population projections: 1) population by age groups, SF1 from 1980 and 2000 and 1990 population by age from MARS (Modified Age-Race-Sex)[1] published by the Bureau of the Census; 2) annual births and deaths from 1980 to 2000 from the Massachusetts Department of Public Health (MassChip) to calculate natural increase and produce estimates of age-specific migration; 3) total and age-specific birth rates from the Massachusetts Department of Public Health to project births; 4) age-specific death rates for Massachusetts in the form of a life table from the U.S. Bureau of the Census.

Projection Methods

A region wide population age group projection was created through use of the Cohort-Migration-Survival method by establishing consistency between past decade-by-decade population and age group fluctuations, and levels of natural increase and net migration and then extrapolating those relationships into the future.

Natural Increase

The population of each community from 1980 to 2000 was broken down into age groups from 0-4 to 75 and over. Each age group was then multiplied by the age group specific survival rate calculated for Massachusetts. The result of this calculation will give an estimate of how many individuals from each age group will have survived 5 years after a starting point. Starting points are usually based on the 1980 and 1990 US Census population counts.

Birth rates by age of mother are calculated by taking the number of births by age of mother for each town for years from 1980 to 2000 (in five year increments) and dividing them into the number of females that resided in the community between forecast intervals. For example the total number of births for a community between 1980, 1985, 1990, 1995 for each age group would be divided by the number of females in each age group reported by the US Census for the same time periods.

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[1] The primary reason for producing the MARS file is to redistribute the "Some Other Race" counts in the Census to the OMB race categories which do not include and "Other" response. The Census Bureau uses various indicators such as surname and place of to determine the race of the individual. This was done in both 1990 and 2000.

The 1990 MARS data includes another important correction that was not necessary in the 2000 data. In 1990, the Census questions on age did not accurately determine age 0 for the under 1 population. It also overstated the number of centenarians. The 1990 MARS file included corrections for this age misreporting, hence the difference between age distributions from the 1990 STF1 and the 1990 MARS. For use in projections, the MARS file is the better distribution of age.

Natural increase is calculated by taking the population by age group at a starting point, multiplying the age groups by age group specific survival rates to determine the estimated population that will have survived the 5-year period.

The females of childbearing age must be estimated by taking the population age groups between 15-50 and multiplying them by 52% (the proportion of the population that is female). The resulting number of females in each age group can then be multiplied by the specific birth rates associated with each age group for each town. The result of the last calculation is the estimated population of the 0-9 age groups for the following time period.

In summary, the natural increase for the 10-75 plus age groups was calculated by multiplying each age group by the specific survival rate established at the state level. The 0-9 age groups were calculated by establishing the community specific birth rates by age of mother and then multiplying those rates by the corresponding estimated female age group populations.

Migration

Historical absolute migration is calculated by subtracting the expected population in an end point period from the actual population reported by the US Census. The expected population is calculated by using the natural increase methodology discussed above. For example, natural increase was calculated for each community from 1980 to 1990. The result of this calculation would be considered the expected population in 1990. The expected population would be subtracted from the actual population reported by the US Census in 1990 to determine the difference in the two figures. The difference or net migration represents the population that either moved in (positive migration) or out (negative migration) of the community over the past 10 years.

The above calculations were performed for the periods of 1980-1990, 1990-2000, and an average of the 1980-1990 and 1990-2000 periods. It has been observed that in general most communities experienced negative migration in the 1980-1990 period and positive migration in the 1990-2000 period (despite the 1988 to 1992 recession).

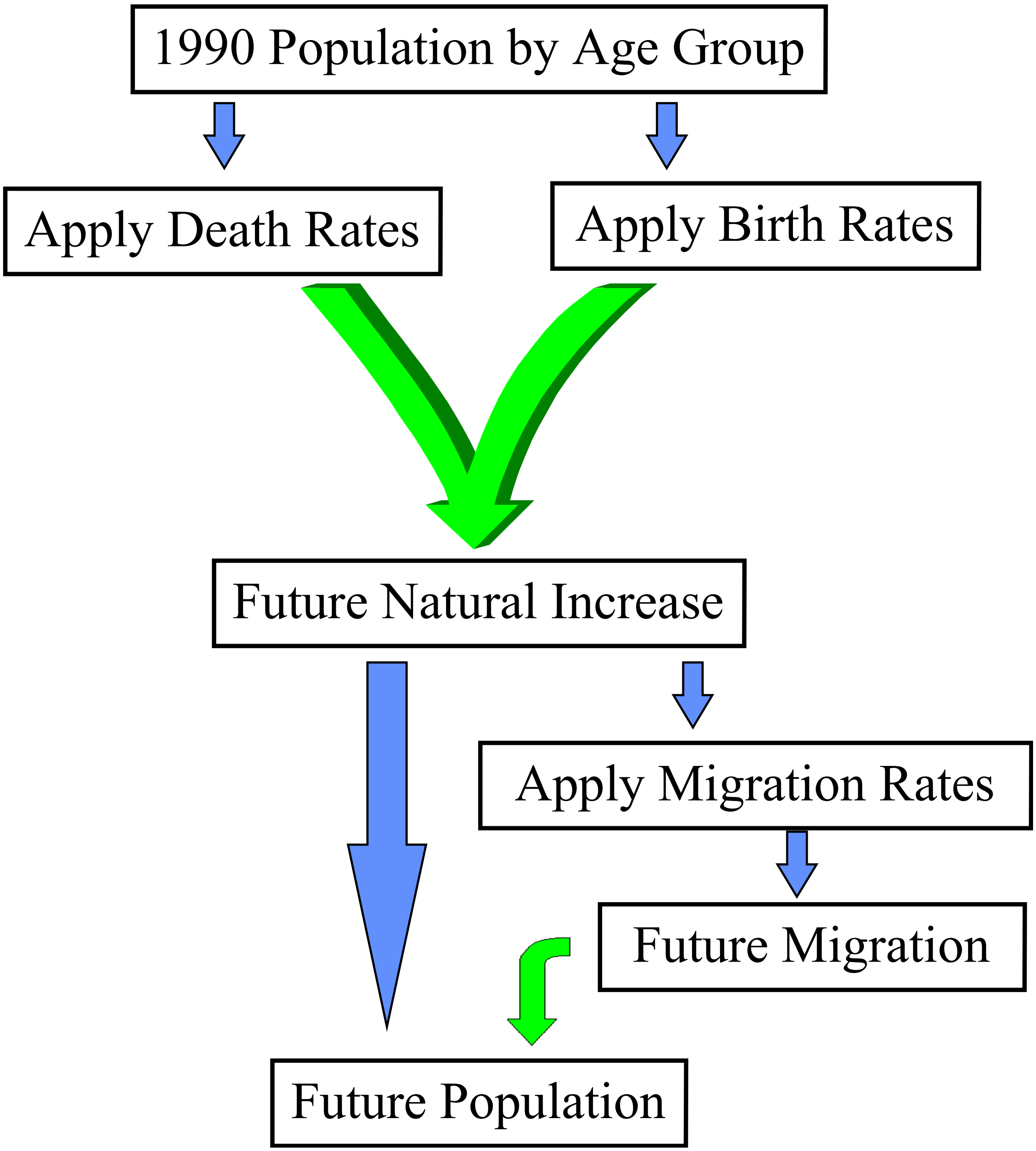
Using the above absolute migration calculations for each age group, the migration rate of each age group is calculated by dividing the number of people that migrated in each age group by the number of individuals that existed in the age group in the starting period.

Forecast years

Year 2005 was calculated by using the US Census 2000 population as a starting point. Natural increase was calculated for each community using the method described above. Three series of net migration were calculated using the migration rates established for the 1980-1990 (regional low), 1990-2000 (regional high) periods and then the average of the two periods (regional medium). The net migration result, which is derived by multiplying the migration rate by the number of people in each age group that survived from the starting period, is then added to the surviving population in each age group. For example if 100 people existed in an age group in the starting period of 2000 and 90 survived to the period of 2005, and there was a migration rate of +10% or 9 people, then the 2005 ending population would be 99.

Three forecasts (low, high, and medium) were developed for each community for each five year period to the year 2025. In some cases our population and employment projections have modified the most severe trends, which otherwise would have resulted in very large gains or losses. Our methodology compensates for small characteristic changes that communities go through over time. One of the three forecasts was ultimately selected for each of the 164 communities based on the reasonability of historical trends, community feedback, and professional judgement regarding migration trends due to socioeconomic patterns in the Boston region.

Cohort Survival-Migration Method Population Forecast



Employment

Data Requirements

Data used for the employment projections included ES-202 Series data from the Massachusetts Department of Employment and Training from 1985 to 2001. This data included total employment and employment by sector for the 164 communities in the regional model area. The employment by sector data is derived from reports filed by all employers subject to unemployment compensation laws, both state and federal.

Projection Methods

Employment projections were based on 18 years of historical data in the region and by community. The projections were prepared for total employment and by sector. The rate of change was calculated for employment data from 1985-2001 for each community's total employment and by sector. This rate of change or slope represents the amount by which jobs grew or decreased annually. Using 2001 as a base year, the historical rate of change was used to project employment figures to 2005, 2010, 2015, 2020 and 2025.

The projected total employment and jobs by sector were first calculated for both the 101 MAPC communities and the 164 communities in the regional model, to establish a regional "control" figure. Then, totals were calculated for the individual communities for total employment and by sector, and aggregated for comparison to the regional control. If the aggregated community total and sector figures did not match the regional control figures, the community figures were scaled so that they matched the regional numbers.

Historical manufacturing data was generally limited to the years 1992-2001, since the tremendous loss of manufacturing jobs during the 1980s would have caused unrealistic losses in the forecast.

As explained in the introduction to this document, some forecasts and the regional and subregional totals were later altered as a result of community feedback. Also, in some cases in which projected numbers for individual communities seemed unrealistically low, either the slope, the period of historical data used to calculate the slope, or the projected numbers themselves were altered.

Households

Data Requirements

Data used for the household projections included data from the United States Census from 1990 and 2000. This data included total households, number of residents in group quarters, total population, total population forecasts (see methodology above) and number of persons 20 and over for the 164 communities in the regional model.

Projection Methods

Total household and total population data from the Census was used to calculate persons per household for 1990 and 2000. (Total group quarters population, that is, individuals living in dormitories, hospitals, or other institutional environments, was subtracted from total population before doing this calculation) A projection of persons per household was then calculated based on the percent change from 1990 to 2000, using each successive forecast year (2005, 2010, 2015, 2020 and 2025) as the base year.

The projection for total households was calculated by dividing the total projected population in each community (minus group quarters) by the projected persons per household data.

II. Targeted Growth Scenario/Transportation Analysis Zones

The actual population and employment totals for the 101 MAPC communities used in the 2003 regional transportation plan are based on a "Targeted Growth" scenario, as was done for the last plan. This scenario assumes limited growth in communities with constrained water supplies, and reallocates some of this growth to communities well served by transit stations. The idea is for growth to occur in areas that are best able to handle it. The Targeted Growth scenario alters the baseline population and employment forecasts, therefore leading to different results in some communities.

These Targeted Growth community totals have also been allocated to Transportation Analysis Zones (TAZs) within each MAPC community. TAZs provide the regional transportation model with a finer level of detail for analyzing trips around the region. A map showing TAZs and the allocation of Targeted Growth numbers to each TAZ was sent to each community. Unless MAPC received information to the contrary, future growth was allocated among TAZs based on the 2000 Census results for population and 1991 Dun and Bradstreet employment data (updated for 1995 by CTPS).

III. Community Review

The medium baseline population and employment projections, Targeted Growth Scenarios and the TAZ maps were sent out to the head planner and selectman of every MAPC municipality. For the 63 communities outside of MAPC, the projections were sent to the appropriate Regional Planning Agency for comment. Communities were asked to comment on the following:

1) Does MAPC's projection of your community's future population and employment seem unreasonably high or low? (Perhaps we missed a recent change.)
2) Are there any large scale activities in your community or your neighboring communities that may cause your projections to need adjustment? (For example, a large subdivision or office park may have just been approved in your community.)
3) Are recent or future developments expected in different areas of your community than we have focused on in our Targeted Growth scenarios? (Perhaps we need to change the TAZ allocation.)

Community comment packages also included the dates and times of eight public meetings, where community members could hear a presentation on the projections, ask questions and offer comments in person. In preparation for these meetings electronic copies were sent to all MAPC members in the eight subregions. In addition MAPC staff members were available for one on one conversations or visits to meet with individual communities by request.

We received community comment from over 50% of the MAPC towns and about half of the Regional Planning Agencies. Community comments ranged from general agreements and disagreements to detailed spreadsheets of future development patterns that are contrary to historic trends.

In finalizing the baseline population projections, community comments were used to choose between the low, high or medium projections. Community comments were also used to alter historical trends in the employment forecasts. In addition community comments were used to allocate future growth in TAZ's. In cases where Regional Planning Agencies offered their population and employment numbers, we used their projections.

APPENDIX F

2000 Base Case & 2025 No-Build Assumptions

Appendix F - Project Descriptions for 2000 Base Case and 2025 No-Build Projects

2000 Base Case Projects

Highway Projects

Route 53, Phase I (Hanover): Widening of Route 53 from Route 3 to Mill Street (Hanover) was completed by MHD in 1994. This project widened Route 53 from a two-lane to a five-lane roadway segment.

HOV Lane on I-93 (Mystic Avenue): This MHD project is an extension of the existing southbound HOV lane to the Sullivan Square (Somerville) off-ramp. The HOV lane is for vehicles with two or more occupants and is a total of 2.03 miles in length. The extension was opened in September 1994.

HOV Lane on the Southeast Expressway: This six-mile HOV lane is between Furnace Brook Parkway (Quincy) and Freeport Street (Dorchester-Boston). The facility opened in November 1995. It uses contra-flow technology, in which a travel lane is reallocated from the off-peak side of the expressway to the peak side for the duration of the peak period. Originally the HOV lane was for vehicles with 3 or more persons. This does not include the revision to the occupancy rate, which was reduced to 2 or more persons via a sticker program and then later instituted as 2 or more by right in 1999.

Ted Williams Tunnel: The Ted Williams Tunnel (aka/ Third Harbor Tunnel) extends 1.6 miles (.75 miles under water) from South Boston (Boston) to Logan Airport property (East Boston). It opened for commercial traffic only on December 15,1995. The approximate cost for the tunnel was $1.5 billion.

South Boston Bypass Road (aka/Haul Road): The roadway segment runs from the Ted Williams Tunnel (South Boston) to near the I-93/Massachusetts Avenue interchange (Boston). The roadway is restricted to commercial vehicles only. It was opened in July 1993. This roadway project is part of the Central Artery project.

Blue Hill Avenue Signal Coordination: This MassHighway project involved the coordination of signals along the Blue Hill Avenue corridor in Boston.

Brighton Avenue Signal Coordination: This MassHighway project involved the coordination of signals along the Brighton Avenue corridor in Boston.

Marrett Road Signal Coordination: This MassHighway project consists of reconstructing Route 2A (Marrett Road) from I-95 (Route 128) west to beyond the Massachusetts Avenue extension.

Beverly Salem Bridge: Replace a drawbridge over the Danvers River/ Beverly Harbor connecting the cities of Beverly and Salem with an elevated fixed structure. The bridge opened for traffic on August 2, 1996.

Appendix F - Project Descriptions for 2000 Base Case and 2025 No-Build Projects

Route 20, Segment 1 (Marlborough): Widen a 1.1-mile section of Route 20 from 2 lanes to 4 lanes. The project extends from just west of Farm Road to the Raytheon traffic lights just east of DiCenzo Boulevard. The project includes the replacement of traffic signals at the intersection of Route 20 and Farm Road & Wilson Street, the installation of traffic signals at DiCenzo Boulevard (West), and the coordination of these two signals and existing signals at Hager Street and Raytheon Company Drive. This project opened to traffic in October 1999.

Leverett Circle Bridge (Charlestown): A part of the Central Artery/Tunnel project, these new ramps connect the Tobin Bridge via a parallel four-lane bridge with Storrow Drive and Leverett Circle area on the north-western edge of downtown Boston with points north of the Charles River.

I-495 interchange (Marlborough/Southborough): Construct an interchange to Interstate 495 between Route 9 and Route 20. Major elements of the work include the construction of four entrance/exit ramps for I-495 with two bridges and a connector road from the ramps to Crane Meadow Road, as well as the reconstruction and signalization of Crane Meadow Road. This project was advertised in September 1998 and work is ongoing.

I-93/Industriplex interchange (Woburn): Construct an interchange to Interstate 93 between Interstate 95 and Route 129. Major elements of the work include the construction of four entrance/exit ramps for I-93 with two bridges and a connector road from the ramps to Commerce Way, as well as the reconstruction and signalization of the Commerce Way intersection. This project was advertised in June 1997 and was opened to traffic in October 2000.

Quincy Center Concourse, Phase I (Quincy): Construct the Quincy Center Concourse Bridge connecting Burgin Parkway to Parking Way. The work also includes the reconstruction of sections of Burgin Parkway, the Granite Street Connector, and Parking Way, including the installation of an interconnected traffic signal system. The 2025 No-Build Scenario does not include the final two phases of the Quincy Center Concourse project – the connection of Burgin Parkway to Hancock Street (the Westside Link) and the connection of Hancock Street to Mechanic Street/ Revere Road (the Eastside Link). This project was advertised in October 1998.

Route 62 and Middlesex Turnpike (Burlington): Make traffic safety improvements to Route 62 between the Route 3 overpass and Network Drive (formerly Kent Road) and to Middlesex Turnpike from Lexington Street to Terrace Hall Avenue and Network Drive. The improvements to Route 62 include the installation of a traffic signal and the reconstruction of two others, the widening of the roadway from two to four lanes, and the installation of a sidewalk along one side of the roadway. Work on Middlesex Turnpike includes the installation of two traffic signals and the reconstruction of two others, the widening of the roadway from two to four lanes and an additional left turn lane at three separate locations, and the installation of a sidewalk along one side of the roadway.

Route 9 (Wellesley): Widen Route 9 from 4 lanes to 6 lanes from Willow Street to the Interstate 95 (Route 128) northbound on-ramp. This project was advertised in July 1999 and completed in 2000.

Appendix F - Project Descriptions for 2000 Base Case and 2025 No-Build Projects

Route 138 (Canton): Widen Route 138 from 2 lanes to 4 lanes from the Route 128 Interchange (the northern limit of the Washington Street Bridge) to 200 meters north of the intersection of Route 138 and Royal Street/Blue Hill River Road. This project was advertised in August 1999 and was open to traffic in October 2000.

Bridge Street (Salem): Widening of Bridge Street from Flint Street to St. Peter Street to two lanes in each direction, including the reconstruction of the Washington Street rotary. The benefits of the project include a lessening of traffic congestion, operational improvements, improved access to the commuter rail station, and improved safety.

Transit Projects

Urban Ring bus service: This MBTA circumferential bus service was begun in 1994. It consists of three limited stop bus routes providing connections among the Red Line, the Orange Line and the Green Line branches. The three services are:

- CT1: Central Square (Cambridge) to B.U. Medical Center (Boston)
- CT2: Kendall Square (Cambridge) to Ruggles Station (Boston) via Longwood Medical area. The service extension to Sullivan Square began in 2000.
- CT3: Andrew Station (South Boston) to Longwood Medical area (Boston) via Ruggles Station. The service extension of the CT3 to Logan Airport was instituted by the MBTA in September 1999.

Worcester Commuter Rail, Partial Service: This MBTA commuter rail service from Framingham station to Worcester station with no intermediate stops began in September, 1994. This includes four inbound trains from Worcester in the morning and 1 in the afternoon and four outbound trains from Framingham in the afternoon and 1 in the evening. This service includes the Grafton Station, which opened in February 2000.

Additional Park and Ride Spaces: These are the new parking spaces added between January 1, 1991 and December 31, 2000. Parking spaces were added at commuter rail stations, including Needham Heights, Worcester, Lowell, Lynn, Readville and West Concord.

South Station Transportation Center: This MBTA improvement is the intercity bus terminal above the commuter rail tracks and platforms at South Station. The facility was opened in October 1995. The facility serves intercity bus carriers, major regional carriers and commuter bus operators. The bus concourse has 23 sawtooth docks, four pull-through docks and two airport link docks. This does not include a pedestrian connector between the bus station and the railway station.

Amtrak Northeast Corridor Electrification: This Federal Railroad Administration/Amtrak project involves the electrification of the Northeast Corridor rail line from Boston to New Haven, CT, the purchase of high-speed train sets and expansion of Boston to New York passenger train service. Service using the electrified track began in 2000. Acela high-speed service began in December 2000.

Appendix F - Project Descriptions for 2000 Base Case and 2025 No-Build Projects

Commuter Boat Service in the Inner Harbor: Additional MBTA commuter boat service includes new service from Lovejoy Wharf (North Station-Boston) to Courthouse Fan Pier (South Boston) and World Trade Center (South Boston). This is in addition to existing service at Charlestown Navy Yard, Long Wharf (Boston), and Logan Airport (Boston). Lovejoy Wharf and Courthouse Fan Pier were both opened in 1999.

Newburyport Commuter Rail Service: Extension of the MBTA commuter rail line from Ipswich station (Ipswich) to Newburyport, a total length of 9.6 miles. There is an intermediate stop with a new station and associated parking at Rowley. The service opened in October 1998. The additional parking at Rowley and Newburyport stations is included in the 15,931 New Parking Spaces. The service includes 13 inbound and 13 outbound trips during the week and 6 inbound and 6 outbound trips on the weekend.

Old Colony Commuter Rail (two lines): This MBTA commuter rail service includes the restoration of two of the Old Colony lines. Service runs from South Station to Middleborough/Lakeville with six intermediate stops and service from South Station to Kingston and Cordage/Plymouth with six intermediate stops. Service on the two lines began in September 1997. The additional parking at the stations is included in the 15,931 New Parking Spaces. This project does not include the proposed Greenbush branch of the Old Colony commuter rail line.

Route 128 Amtrak Station: This project jointly constructed by Amtrak and the MBTA will consist of a new station for the Northeast Corridor Amtrak service and the MBTA Attleboro service. At full-build, the station will have an associated parking garage with 2,750 parking spaces (550 reserved for Amtrak). Electrified trains (Amtrak) began serving the station in 2000. Full build is not expected until 2005 with the completion of an access road to Route 128.

Hingham Ferry: The Hingham Ferry provides commuter boat service from the Hingham Shipyard to Rowes Wharf in downtown Boston. Service has been provided since the late 1970s, and in the late 1990s, high-speed catamarans were introduced to the service. This project is a substitute of the Greenbush Line SIP commitment until the line is in service.

Improved service on the Haverhill Commuter Rail Line: In July 1997, increased service was enacted on the Haverhill commuter rail line. Increased service included the running of eight additional trains each day, including express trains that shorten peak period travel time. This project is a substitute of the Greenbush Line SIP commitment until the line is in service.

Salem-Boston Express Bus: Express bus service between Salem and Boston was introduced in the fall of 1997. Service is provided from the North Shore via Lynn Central Square and Logan Airport's Terminal C providing direct, one-seat service between the North Shore and the South Boston Piers area, the Financial District, and Downtown Crossing. This project is a substitute of the Greenbush Line SIP commitment until the line is in service.

Appendix F - Project Descriptions for 2000 Base Case and 2025 No-Build Projects

2025 No-Build Projects

Highway Projects

Central Artery: The Central Artery/Tunnel project is the largest, most complex and technologically challenging highway project in American history. The estimated cost of the project is $14 billion with a final completion date estimated at April 2005. This Massachusetts Turnpike Authority project is highlighted by the construction of an 8-to-10 lane, limited access, 1.5 mile underground expressway to replace the existing elevated I-93 highway. Other components of the project are the Ted Williams Tunnel from South Boston to Logan Airport, an extension of I-90 from near South Station to Logan Airport and Route 1A in East Boston, four major highway interchanges, a cable-stayed bridge across the Charles River, and the reconstruction of an additional 2.1 mile segment of I-93. In all the project is building or rebuilding 161 lane miles of urban highway, about half in tunnels, in a 7.5 mile corridor. Approximate completion dates are:

- Ted Williams Tunnel (opened December 15, 1995-included in 2000 Base Case)
- South Boston Bypass Road (opened 1993-included in 2000 Base Case)
- Charlestown/Leverett Circle Bridge (opened October 7, 1999-included in 2000 Base Case)
- I-90 Extension to the Ted Williams Tunnel (opened January 2003)
- I-93 Northbound (opened March 2003)
- I-93 Southbound (approximately April 2004)
- Project completion (approximately April 2005)

Massachusetts Avenue/Lafayette Square, (Cambridge): This project realigns the intersection of Massachusetts Avenue, Main Street, and Columbia Street. The signalized intersection will be moved to a realigned 4-way intersection opposite Sidney Street on the south.

Cambridgeport Roadways: Street patterns in Cambridgeport from Massachusetts Avenue to Memorial Drive will be realigned including Sidney Street, Waverly Street, Albany Street and Brookline Street. The benefits of the project include the diversion of traffic away from neighborhood streets, traffic flow improvements, and economic development opportunities.

I-95 (SB)/Dedham Street Onramp (Canton): Construction of a new southbound ramp to I-95 from Dedham Street. There is no signal at the onramp. This project will provide direct access to Interstate 95 (South) from Westwood's University Avenue industrial area. The benefits of the project include a reduction in congestion and delays at the current access point (Blue Hill Drive) and improved access for commuters wishing to use the Route128 commuter rail station.

Route 140 (Franklin): Route 140 will be widened from one lane in each direction to two lanes in each direction from I-495 to Garelick Farms. The alignment of Route140 will also be altered to accommodate an improved diamond interchange. The length of Route 140 affected is 1.2 miles. The benefits of the project include a lessening of traffic congestion, operational

improvements at the affected interchange, associated travel time savings, and economic development opportunities.

Route 139 (Marshfield): This MassHighway project consisted of the reconstruction, widening and installation of traffic signals on Route 139 in Marshfield from the Route 3 off-ramp to the Pembroke town line.

Route 20, Segments 2&3 (Marlborough): From Farm Road to the Sudbury line, Route 20 will be widened from one lane in each direction to two lanes. The 0.9-mile portion of Route 20 from Felton Street to Ames Street will also be widened from one lane in each direction to two lanes in each direction. The installation of a new signal is also included at the intersection of Route 20 and Williams Street.

Bridge Street Bypass (Salem): Construction of a new road along the North River from Veteran's Memorial Bridge to the vicinity of St. Peter Street and Bridge Street.

Route 128 Additional Lanes (Randolph to Wellesley): Widening Route 128 from three lanes in each direction to four lanes in each direction in both directions from Randolph to Wellesley. The lane volumes for this corridor are the highest on any portion of Route 128.

Route 38 (Wilmington): This MassHighway project consists of widening and reconstructing Route 38 from Route 129 (Richmond Street) to Middlesex Avenue. Signalization improvements will be made at the intersections of Route 38/Clark Street, Route 38/Wilmington Plaza and Route 38/Richmond Street.

Route 1 and Associated Improvements (Foxborough): ($14 million) As a result of a directive from the Massachusetts Legislature, MassHighway will oversee a project to improve access to the new CMGI Field being built adjacent to Foxboro Stadium. Contract #1 focuses on the area from the intersection between Route 1 and North Street to the intersection of Route 1 and Pine Street in the town of Foxborough. A grade-separated interchange is to be built at the north end of the stadium on Route 1. A flyover bridge/ramp will be built on the south side of the stadium to Route 1. A new access drive will be built from North Street into the stadium. The cost of this contract is $10 million. Contract #2 deals with improvements along Route 1 between the two nearest interstate highways. A new slip ramp is to be constructed at the Route 1 / Interstate 95 interchange in Sharon. New sidewalks will be built on North Street from the access road to the Walpole town line. The shoulder along Route 1 in Foxborough and the Route 1 / Interstate 495 ramps in Plainville will be widened. Regional and local signage improvements are also part of this contract. The cost for Contract #2 is $4 million.

Route 3 North: ($385 million) The project widens Route 3 along a 21-mile stretch from Burlington to the New Hampshire border. The affected towns are Bedford, Billerica, Chelmsford, Westford, Tyngsborough, as well as Burlington. The highway is currently 2 lanes in each direction and will be expanded to 3 lanes. There will also be full right and left shoulders in each direction. All of the bridges along the corridor will be reconstructed to accommodate a potential fourth lane in each direction. The average daily traffic volumes for the New Hampshire border end of the project were 63,800 vehicles in 1999. On the Billerica portion of the project,

the average daily traffic volumes were 84,000 vehicles. The MEPA approval process is complete. The design-build agreement was approved by MassHighway on August 2, 2000. There is an approximate 42-month design/build schedule. The cost and programming for this project is being carried in the Northern Middlesex Council of Governments Transportation Plan.

Transit Projects

North Station Improvements: This MBTA project includes the relocation of the above ground portion of the Green Line to Lechmere to underground. The new rapid transit station will include a super platform with easy transfers between the Green and Orange lines.

Blue Line Modernization: The modernization program to allow for six-car operation is underway. Modernization of stations from Wood Island to Wonderland is complete. Aquarium station will be renovated in conjunction with the Central Artery work.

Additional Park and Ride Spaces: Included in the recommended plan is the addition of at least 1,050 new surface parking spaces. At an average cost of $5,000 per space, this is a total cost of approximately $5.2 million. Additional proposed spaces are located at the following commuter rail sites within the Boston MPO region: Hamilton, West Gloucester, North Wilmington, Walpole and Sharon. An additional 1,685 spaces outside of the Boston MPO region were included in the travel demand model analysis. Locations included Mansfield, Middleborough, Halifax and Lowell. These figures do not include parking associated with the Worcester or Greenbush Commuter Rail extensions. The 2,100 Park and Ride spaces being built by the Massachusetts Turnpike Authority at Interchanges 9-16 on the Massachusetts Turnpike are also included.

Worcester Commuter Rail, full service including new stations: This MBTA service includes intermediate stops in Westborough, Southborough and Ashland. Each stop includes a new commuter rail station with associated parking. This service will replace the interim service provided between Framingham and Worcester. The stations were opened in 2002. The stations were proposed as a substitute of the Greenbush Line SIP commitment until the line is in service.

Silver Line – Transitway, Phase 1: This MBTA transitway will provide service via tunnel from South Station (Boston) to the World Trade Center (in the vicinity of Viaduct Street) with an intermediate station stop at Courthouse Station (in the vicinity of Northern Avenue and Farnsworth). Construction on this project is underway and Phase 1 service is scheduled to begin in 2003. It also includes a surface route from the D Street portal to City Point (South Boston).

Silver Line – Washington Street, Phase 2: ($54,000,000) The MBTA's Silver Line runs along Washington Street from Dudley Square in Roxbury to Downtown Crossing in the city of Boston. The vehicles used on the route are 60-foot articulated compressed natural gas buses and their low-floor design makes them handicapped accessible. The buses operate in mixed traffic from Dudley Square to Melnea Cass Boulevard where they then enter a reserved lane. At the Massachusetts Turnpike, the reserved lane ends and the vehicles enter mixed traffic again. Proposed stations for the Silver Line include Dudley Square, Melnea Cass Boulevard, Lenox Street, Newton Street, Cathedral, East Berkeley Street. Additionally, the vehicle will make stops

at Herald Square, New England Medical Center, Chinatown, and Downtown Crossing. This project is a Central Artery/Tunnel commitment.

Mattapan Refurbishment: This MBTA project is the refurbishment of the existing PPC (Presidential Conference Committee) cars currently running on the Mattapan High-Speed line (Boston-Mattapan-Milton). There are no scheduled run time or frequency improvements associated with this project.

Airport Intermodal Transit Connector: ($35 million) This project would provide a new transit service in Boston from South Station Intermodal Center to the Logan Airport terminals. There would be approximately eight vehicles, which would be similar to those used in the Silver Line-Transitway Section A, except that these vehicles have more luggage storage space. The service would use the MBTA South Boston Piers Transitway tunnel from South Station to South Boston and then the Ted Williams Tunnel to the five Logan Airport terminals. The capital portion of this service would be sponsored by Massport. This service would provide for enhanced connection between the Red Line and Logan Airport. There would continue to be AITC bus service between the Blue Line Airport Station and the Logan airport terminals. This project must be completed by June 2004 as part of the administrative consent order between EOTC and EOEA.

Industriplex Intermodal Center (Woburn): This is a joint agency (MHD, Massport, MBTA) project. The Industriplex in Woburn provides an intermodal facility for the northern suburbs that combines MBTA commuter rail, Massport's Logan Express shuttles, a 2,400 space parking lot, and a station on Amtrak's future service to Portland, Maine. Ground was broken on the Industriplex in 2000. MassHighway has completed a new interchange with Interstate 93 that improves access to the facility. In addition to its intermodal component, Industriplex provides improved access to both I-93 and Route 128, is adjacent to growing employment centers and increases parking capacity. The parking increase partially addresses SIP commitment of new park and ride spaces.

New Commuter Rail Station at JFK/UMASS Station: This station was added to the Old Colony commuter rail service lines and provides connections to the MBTA Red Line, local bus service, and shuttle service. Access is also provided to UMASS and the JFK Library. This project is a substitute of the Greenbush Line SIP commitment until the line is in service.

Capital Investments Not Affecting the Travel Model

Green Line Vehicles-Type 8: The MBTA is in the process of receiving new Green Line vehicles from the manufacturer. The vehicles feature a low-floor design that allows mobility-impaired riders to access them at any of the Green Line stations that have been designated as key stations. The Type 8 vehicles also feature interior message displays, electronic exterior route indicators, and recorded station announcements. The MBTA will purchase 100 new Green Line vehicles.

Blue Line Vehicles: The MBTA will purchase new six-car trainsets for the Blue Line. These vehicles can be used on the Blue Line once the reconstruction of stations has been completed. The Blue Line is the only of the three subway lines to operate only four-car trainsets during peak

periods. Reconstruction of the existing stations involves the lengthening of platforms so that the longer trains can be accommodated. Once the platforms have been lengthened and the new trainsets have been purchased, the current Blue Line vehicles may be used to supplement existing vehicles on the Orange Line.

Low Emission Buses: The MBTA is committed to the purchase of 314 compressed natural gas (CNG) buses for use systemwide. The purchase of the new vehicles is required by 2004 in the consent order agreed to between EOTC and EOEA in 2000 relating the fulfillment of Central Artery project mitigation commitments.

Dorchester Branch Modernization: The MBTA will reconstruct four stations on the Dorchester branch of the Red Line. The four stations included in the project are Savin Hill, Field's Corner, Shawmut, and Ashmont--all located within the Boston neighborhood of Dorchester. In addition to the station work, some older bridges along the Ashmont branch will be rehabilitated.

Charles Street Station Modernization: This project involves the reconstruction of the Charles Street station on the Red Line. Goals of the project are to make the station accessible and to improve its relationship to the surrounding Charles Circle/Cambridge Street area.

Bus Maintenance Facilities: The MBTA's purchase of 314 new CNG buses marks the first time this type of vehicle will be used in the system. In order to service these alternative fuel vehicles, the MBTA will build new and will retrofit existing facilities to maintain the CNG fleet.

Automated Fare Collection: This project involves complete replacement of the MBTA's current fare collection equipment on all subway, trolley, trackless trolley and bus vehicles. The new automated fare collection (AFC) equipment will provide several benefits to the MBTA and its riders. In addition to the current monthly pass system, riders will be able to purchase stored value cards. This fare media acts as a debit card, allowing passengers to use any mode in the system provided that the dollar value remaining on their card is sufficient to pay the fare. Value can be added to stored value cards after they are purchased, either at fare collector booths or at automatic vending machines (AVM). Stored value cards are beneficial to less frequent riders because they can have the convenience of a pass without having to invest in an unlimited ride monthly pass. They also reduce the amount of actual cash transactions in the system. AFC turnstiles will be better able to provide accurate data on fare collection and revenue for the MBTA. Since AFC turnstiles have both read and write capabilities, the MBTA can use them as a paperless method of providing free transfers between buses. Another fare policy that can be implemented with AFC is the distance-based fare.

Green Line Accessibility: This project involves the completion of the Green Line's key station program. The key station program will put the Green Line in compliance with the Americans with Disabilities Act (ADA). Copley, Arlington, and Government Center stations in the central subway will be made accessible. In addition, several key stations along the Green Line's surface routes will be made accessible through the construction of elevated platforms.

Appendix F - Project Descriptions for 2000 Base Case and 2025 No-Build Projects

AMTRAK Service to Portland, Maine: In 2001, AMTRAK reintroduced service between Boston and Portland, Maine. The service uses North Station as its Boston terminus. Other stops include Haverhill, Massachusetts; Exeter, Dover and Durham, New Hampshire; and Old Orchard Beach, Wells and Saco, Maine. Travel time between Boston and Portland is approximately two and half hours.

Project descriptions for the 2025 Build Projects in the recommended plan are included in Chapter 4 – The Transportation Plan.

APPENDIX G

Alternative Project Lists Tested with the Transportation Model

Scenario 1
Based on Projects included in the 2000-2025 Plan Update

Highway Projects

Crosby Drive (Bedford)
Middlesex Turnpike (Bedford & Burlington)
Rte. 128 Capacity Improvements (Beverly to Peabody)
Rte. 1A/Chelsea St. Bridge Connection
Route 1A/Boardman Street Grade Separation (Boston)
Rutherford Avenue (Boston)
Double Stack Initiative (Boston to Newton)
I-93/I-95 Interchange (Canton)
I-95 (NB)/Dedham Street Ramp (Canton)
Concord Rotary (Concord)
Route 2/Crosby's Corner (Concord and Lincoln)
Route 1/114 Corridor Improvements (Danvers & Peabody)
Telecom City Boulevard (Everett, Malden & Medford)
Revere Beach Parkway (Everett & Medford)
Route 126/135 Grade Separation (Framingham)
Rte. 9/Rte. 126 Interchange (Framingham)
Double Stack Initiative (Framingham to Worcester)
Route 53 (Hanover)
Route 53/228 (Hingham and Norwell)
Rte. 128 Capacity Improvements (Lynnfield to Reading)
Route 1 Improvements (Malden & Revere)
I-495/I-290/Route 85 Interchange (Marlborough)
Double Stack Initiative (Natick & Wellesley)
Needham Street/Highland Avenue (Newton & Needham)
Burgin Parkway (Quincy)
Quincy Center Concourse, Phase 2 (Quincy)
I-93/I-95 Initiative (Reading & Woburn)
Mahoney Circle Grade Separation (Revere)
Route 1/Route 16 Interchange (Revere)
Route 1A/Route 16 Connection (Revere)
Boston Street (Salem)
Bridge Street (Salem)
I-93/Mystic Avenue Interchange (Somerville)
Naval Air Station Access Improvements (Weymouth)
Route 18 (Weymouth)
Route 3 South Additional Lanes (Weymouth to Duxbury)
I-93/Ballardvale Street Interchange (Wilmington)
I-93/Route 129 Interchange (Wilmington)
New Boston Street Bridge (Woburn)

Plan Update Recommended Transit Projects

Arborway Restoration (Boston)
Red Line/Blue Line Connector (Boston)
Russia Wharf Ferry Terminal (Boston)
Old Colony/Greenbush Commuter Rail (Boston to Scituate)
Medford Hillside Green Line (Boston, Medford & Somerville)
Fairmount Branch Improvements (Boston)
Silver Line Phase 3 (60/40) (Boston)
Urban Ring Phases I & 2 (Compact Communities)
100 Additional Buses to Improve Service on Existing Routes
Assembly Square Orange Line Station (Somerville)
Blue Line to Lynn

Scenario 2
Based on Recommendations from the Environmental Justice Committee

Highway Projects

Crosby Drive (Bedford)
Middlesex Turnpike (Bedford & Burlington)
Rte. 128 Capacity Improvements (Beverly to Peabody)
Rte. 1A/Chelsea St. Bridge Connection
Route 1A/Boardman Street Grade Separation (Boston)
Rutherford Avenue (Boston)
Double Stack Initiative (Boston to Newton)
I-93/I-95 Interchange (Canton)
I-95 (NB)/Dedham Street Ramp (Canton)
Concord Rotary (Concord)
Route 2/Crosby's Corner (Concord and Lincoln)
Route 1/114 Corridor Improvements (Danvers & Peabody)
Telecom City Boulevard (Everett, Malden & Medford)
Revere Beach Parkway (Everett & Medford)
Route 126/135 Grade Separation (Framingham)
Rte. 9/Rte. 126 Interchange (Framingham)
Double Stack Initiative (Framingham to Worcester)
Route 53 (Hanover)
Route 53/228 (Hingham and Norwell)
Rte. 128 Capacity Improvements (Lynnfield to Reading)
Route 1 Improvements (Malden & Revere)
I-495/I-290/Route 85 Interchange (Marlborough)
Double Stack Initiative (Natick & Wellesley)
Needham Street/Highland Avenue (Newton & Needham)
Burgin Parkway (Quincy)
Quincy Center Concourse, Phase 2 (Quincy)
I-93/I-95 Initiative (Reading & Woburn)
Mahoney Circle Grade Separation (Revere)
Route 1/Route 16 Interchange (Revere)
Route 1A/Route 16 Connection (Revere)
Boston Street (Salem)
Bridge Street (Salem)
I-93/Mystic Avenue Interchange (Somerville)
Naval Air Station Access Improvements (Weymouth)
Route 18 (Weymouth)
Route 3 South Additional Lanes (Weymouth to Duxbury)
I-93/Ballardvale Street Interchange (Wilmington)
I-93/Route 129 Interchange (Wilmington)
New Boston Street Bridge (Woburn)

Transit Projects

Arborway Restoration (Boston)
Red Line/Blue Line Connector (Boston)
Russia Wharf Ferry Terminal (Boston)
Old Colony/Greenbush Commuter Rail (Boston to Scituate)
Medford Hillside Green Line (Boston, Medford & Somerville)
Fairmount Branch Improvements (Boston)
Light Rail on Washington Street
Urban Ring Phases I & 2 (Compact Communities)
100 Additional Buses to Improve Service on Existing Routes
Assembly Square Orange Line Station (Somerville)
Blue Line to Lynn

Recommended Build Scenario

Highway Projects

Crosby Drive (Bedford)
Middlesex Turnpike (Bedford & Burlington)
Rte. 128 Capacity Improvements (Beverly to Peabody)
East Boston Haul Road/Chelsea Truck Route (Boston)
Route 1A/Boardman Street Grade Separation (Boston)
Rutherford Avenue (Boston)
Double Stack Initiative (Boston to Newton)
I-93/I-95 Interchange (Canton)
I-95 (NB)/Dedham Street Ramp (Canton)
Concord Rotary (Concord)
Route 2/Crosby's Corner (Concord and Lincoln)
Route 1/114 Corridor Improvements (Danvers & Peabody)
Telecom City Boulevard (Everett, Malden & Medford)
Revere Beach Parkway (Everett & Medford)
Route 126/135 Grade Separation (Framingham)
Rte. 9/Rte. 126 Interchange (Framingham)
Double Stack Initiative (Framingham to Worcester)
Route 53 (Hanover)
Route 53/228 (Hingham and Norwell)
Rte. 128 Capacity Improvements (Lynnfield to Reading)
Route 1 Improvements (Malden & Revere)
I-495/I-290/Route 85 Interchange (Marlborough)
Double Stack Initiative (Natick & Wellesley)
Needham Street/Highland Avenue (Newton & Needham)
Burgin Parkway (Quincy)
Quincy Center Concourse, Phase 2 (Quincy)
I-93/I-95 Initiative (Reading & Woburn)
Mahoney Circle Grade Separation (Revere)
Route 1/Route 16 Interchange (Revere)
Route 1A/Route 16 Connection (Revere)
Boston Street (Salem)
Bridge Street (Salem)
I-93/Mystic Avenue Interchange (Somerville)
Naval Air Station Access Improvements (Weymouth)
Route 18 (Weymouth)
Route 3 South Additional Lanes (Weymouth to Duxbury)
I-93/Ballardvale Street Interchange (Wilmington)
I-93/Route 129 Interchange (Wilmington)
New Boston Street Bridge (Woburn)

Plan Update Recommended Transit Projects

Arborway Restoration (Boston)
Red Line/Blue Line Connector (Boston)
Russia Wharf Ferry Terminal (Boston)
Old Colony/Greenbush Commuter Rail (Boston to Scituate)
Medford Hillside Green Line (Boston, Medford & Somerville)
Fairmount Branch Improvements (Boston)
Silver Line Phase 3 (60/40) (Boston)
Urban Ring Phases I & 2 (Compact Communities)
100 Additional Buses to Improve Service on Existing Routes
Assembly Square Orange Line Station (Somerville)
Blue Line to Lynn

APPENDIX H

Modeling Information on Alternatives Analyzed During the Development of the Transportation Plan

Table H-1
Travel Model Results

Regional Level	**Year 2000** **Base Year**	**Year 2025** **No-build**	**Percent Growth**	**Year 2025** **Build 1**	**Increase from No-Build**	**Percent Growth over No-build**
Demographic Forecasts						
Population	4,308,800	4,685,500	8.7 %	4,685,471		
Employment	2,412,800	2,837,300	17.6 %	2,837,324		
Households	1,643,950	1,910,750	16.2 %	1,910,756		
Travel Demand Forecasts						
Trip Productions	16,754,800	19,131,600	14.2 %	19,131,592		
Trip Attractions	16,754,800	19,131,600	14.2 %	19,131,583		
Linked Transit Trips	775,000	966,050	24.7 %	1,039,964	73,914	7.65 %
Auto Person Trips	11,225,600	12,322,000	9.8 %	12,256,375	-65,625	-0.53 %
Non-Motorized trips	2,384,400	2,777,700	16.5 %	2,769,405	-8,295	-0.30 %
Transit Mode Split	6.46 %	7.27 %	12.6 %	7.81 %		
Total Commuter Rail Ridership	130,400	181,250	39.0 %	195,850	14,600	8.06 %
Commuter Rail Ridership (North)	46,900	67,250	43.4 %	72,100	4,850	7.21 %
Commuter Rail Ridership (South)	83,500	114,000	36.5 %	123,750	9,750	8.55 %
Rapid Transit Ridership	670,200	798,300	19.1 %	772,300	-26,000	-3.26 %
Blue line Ridership	59,000	72,150	22.3 %	110,650	38,500	53.36 %
Orange Line Ridership	167,500	198,550	18.5 %	186,550	-12,000	-6.04 %
Red Line Ridership	237,000	281,250	18.7 %	232,550	-48,700	-17.32 %
Green Line Ridership	206,700	246,350	19.2 %	242,500	-3,850	-1.56 %
Silver Line Ridership	13,000	27,250	109.6 %	101,200	73,950	271.38 %
Urban Ring BRT	n/a	n/a		86,400		
Local bus Ridership	345,500	427,500	23.7 %	452,450	24,950	5.84 %
Express bus Ridership	24,400	39,600	62.3 %	43,550	3,950	9.97 %
Total Vehicle Trips (modeled)	9,613,400	10,587,600	10.1 %	10,553,030	-34,570	-0.33 %
Average Highway Speed	27.2	26.7	-1.7 %	26.73		
VMT	79,040,650	89,694,650	13.5 %	89,735,000	40,350	0.04 %
VHT	2,614,900	3,097,900	18.5 %	3,013,570	-84,330	-2.72 %

Transit demand constrained to future year parking lot capacities

MEMORANDUM

TO: **Dennis Dizoglio, MPO Chairman**

DATE: **July 15, 2003**

FROM: **Vijay Mahal and Bill Kuttner**

RE: **Ridership Comparison of Silver Line Phase III and Washington Street Light Rail Transit**

Responding to a request from the Environmental Justice Committee, the Working Committee of the Transportation Planning and Programming Committee directed CTPS staff to perform a comparative ridership analysis of the Silver Line Phase III with a Light Rail Transit (LRT) service on Washington Street. The purpose of this memorandum is to document the results of our analysis.

For your convenience and ready reference, a brief project description and service assumptions for the Silver Line Phase III and the Washington Street LRT are provided below.

The Silver Line Phase III project involves building an underground tunnel between New England Medical Center and South Station and providing a through-routed service (one-seat ride) from Dudley Square and Boylston Station to the Seaport area and Logan airport. When complete, the Silver Line corridor would have intermodal connections with the Orange Line at New England Medical Center and Chinatown, Green Line at Boylston, Red Line and Southside commuter rail lines at South Station and Blue Line at Airport Station. As currently envisioned, the Silver Line Phase III would consist of the following services.

Dudley to Boston Marine Industrial Park @ 10-minute headway
Dudley to Boston Convention Center @ 10-minute headway
Dudley to Logan airport @ 10-minute headway
Boylston to Boston Marine Industrial Park @ 10-minute headway
Boylston to World Trade Center @ 10-minute headway
South Station to Logan @ 10-minute headway

The effective headway of the Silver Line on Washington Street would be about 3.5 minutes during the peak periods. In the Phase III tunnel section the effective headway would be about 2 minutes during the peak periods.

The LRT on Washington Street would consist of running a service similar to the Green line from Dudley Square to Park Street Station. The level of service assumed during the peak and off-peak periods is 5 minutes and 7 minutes respectively. Due to capacity constraints in the central subway section, it would not be possible to extend the new LRT service beyond Park Street station and for the same reason, it would not be possible to provide a better frequency of service unless some service reductions are made in the other branches of the Green Line. The stopping pattern assumed for the Washington Street LRT is similar to the current Silver Line Phase I.

Table 1 presents a comparison of ridership forecasts between these two proposed improvements to the Silver line corridor. These forecasts use the most recent demographic and employment projections for 2025 developed by MAPC in May 2003.

In the No Build option, the two Silver Line services are assumed to continue to run independently: the Washington Street service would continue to Downtown Crossing, much as it does today, and the soon-to-open Piers Transitway service, including the Airport Intermodal Transit Connector (AITC), would connect South Station with the Seaport and Logan Airport.

Table 1

Silver Line Corridor

Projected 2025 Ridership

	No Build	Upgrade Washington to LRT	Integrated Silver Line
Piers Transitway + AITC	12,500	12,500	
Washington Street Service	14,750	36,800	
Integrated Silver Line			102,000
	----------	----------	----------
Total Over Corridor	27,250	49,300	102,000

The proposed completion of the Silver Line is projected to almost quadruple the ridership throughout the Silver Line corridor to 102,000 daily riders in 2025. The increase in ridership due to Phase III would be about 74,750 (102,000 – 27,250).

Upgrading Washington Street service to LRT would also increase ridership in the Silver Line corridor, even though there would still be two disconnected services. Ridership on the Washington Street segment would more than double. This is attributed primarily to the fact that there would be a more convenient transfer at Park Street to the Red Line and to Green Line trains going towards North Station and Lechmere. There would be no improvement in the Seaport area, so total ridership throughout the corridor would about double.

Seen in this context, it is perfectly reasonable that the integrated Silver Line would result in a quadrupling of corridor ridership. The key transfer to the Red Line would be made at South Station instead of at Park Street in the LRT proposal. While this moves the core service point away from Park Street, South Station is a much larger employment hub than Park Street or Downtown Crossing. The South Station area is undergoing major commercial expansion, while the Park/Downtown Crossing area is largely built out. Finally the growing Seaport District and ever active Logan Airport provide a rich set of destinations for Silver Line patrons who otherwise would remain isolated in the LRT option.

Many of the riders on the Silver Line corridor would be attracted from existing MBTA services, but some would be attracted from the auto mode, a key measure of transit effectiveness. Table 2 summarizes the power of these investment proposals to attract users away from the auto mode.

Table 2

2025 Regional Linked Transit Trips

	Linked Transit Trips	Transit Mode Share
No Build	966,050	7.27%
All recommended projects in Plan (excluding Phase III)	1,040,050	7.82%
All recommended projects in Plan (substituting Phase III with Washington Street LRT)	1,040,450	7.82%
All recommended projects in Plan (including Phase III but no Washington Street LRT)	1,045,250	7.86%

In 2025 there are predicted to be about a million linked transit trips (person trips, as opposed to boardings, or "unlinked" trips.) These million linked trips will represent a little over 7% of the region's trips. Completing all the transit improvements outside the Silver Line corridor envisioned in the current draft transportation plan would add almost 74,000 trips and increase the transit mode share about a half a percent to 7.82% of regional trips.

Investing in the Silver Line corridor would further increase transit mode share. The LRT upgrade would attract about 400 trips from auto, whereas the integrated Silver Line would generate about 5,200 new transit users, inching the transit mode share up to 7.86%. While the LRT upgrade would be a popular service, much of its ridership would come from existing local bus and Orange Line users. Most of the 102,000 riders on the integrated Silver Line would also be existing transit users, but 5200 would be new to transit. This is because the Silver Line presents auto users an entirely new set of transit capabilities that are otherwise awkward or non-existent.

In conclusion, a rich set of residential, commercial, and regional destinations are located astride the Silver Line corridor. A major transit investment in any segment of this corridor can be expected to attract new users, as the recent growth in Washington Street ridership after completion of Phase I clearly indicates. The model predicts, and observation of development patterns corroborates, that uniting the current Washington Street and Piers Transitway branches in an integrated Silver Line will attract significantly more riders both from auto as well as other congested transit services than an isolated enhancement of either individual branch would.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
Crosby Drive (Bedford)	Model Data	Crosby Drive in Bedford will have a five-lane cross section with two travel lanes in each direction with a center turn lane for its entire length. The project also includes a slip ramp to Route 3 Northbound.	The v/c on Crosby Drive between Rte. 3 and Middlesex Turnpike improves from 0.29 to 0.22 from the No-build to the Build cases.
Middlesex Turnpike/Crosby Drive (Bedford and Burlington)	Middlesex Turnpike/Crosby Drive Transportation Improvements Project Volume 1A—DEIR VHB, Inc. March 1997 Model Data	Crosby Drive in Bedford will have a five-lane cross section with two travel lanes in each direction with a center turn lane for its entire length. The project also includes a slip ramp to Route 3 Northbound. Middlesex Turnpike will be widened by one travel lane in each direction with a sixteen foot raised median from Route 62 in Bedford to manning Road in Billerica.	The Crosby Drive analysis looked at two intersections with existing LOS F and increased their LOS by at least one grade to (D-C) in 2016. These intersections also reduced delay times by almost half. Middlesex Turnpike looked at 8 intersections. Of these 8 total, 7 intersections received LOS grades of F. Under the suggested alternative, these intersections increased their LOS by at least one grade (E-B) in 2016. Delay times were also reduced significantly. The v/c on Middlesex Turnpike South of Concord Road in Billerica improves from 1.47 to 1.22. The v/c also improves on Middlesex Turnpike North of Lexington Street in Burlington from 1.19 to 0.96.
I-95 (SB)/Dedham Street On- Ramp, Canton	Design study is complete; project due for construction in spring 2002 Model Data	Design and construct a SB on-ramp to I-95 from Dedham Street in Westwood. Westbound left turns will not be allowed onto the ramp. Ramp is scheduled for construction in spring 2002. This project provides direct access to I-95 south for traffic from the University Avenue development area in Westwood. Present access is through the Route 128 on-ramp at Blue Hill Drive, a very congested area.	About 1/3 of the Blue Hill Drive on ramp traffic to Route 128 SB is presently destined for I-95 south. The new on-ramp will improve congestion, queues and delays at the present on-ramp. The v/c on I-95 south of the I-93 interchange degrades from 1.07 to 1.17 from the No-build to the Build cases.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
Route 2/Crosby's Corner, Concord and Lincoln	Draft EIR is complete; FEIR under FHWA review	Design and construct a fly-over bridge for the westbound direction of Route 2. Maintain local access by retaining (with improvements) the existing traffic signal at Route 2/2A/Cambridge turnpike Cutoff. Design and construct service roads between, approximately, Bedford Road and the traffic signal to allow for safe and effective local circulation and access. This is primarily a safety improvement but the project will have congestion and access benefits as well.	Significant safety benefits for Route 2/2A/Cambridge Turnpike Cutoff traffic. Improved Route 2 access and safety for Lincoln residents with homes along Route 2 between Bedford Road and the traffic signal.
Route 1/114 Corridor Improvements, Danvers and Peabody	CTPS and VHB planning and feasibility studies from the early and mid 90s Model Data	Design and construct a single-point diamond interchange at Route 114 and Route 1; improve access from Route 114 to I-95. Design and construct traffic management improvements along Route 114. Project will develop direct connections between Route 1, Route 114 and I-95 and improve traffic flow along Route 114.	Allows for direct access to I-95 from Route 1 and Route 114. Promotes safe and effective traffic flow in the area. The v/c on Rte. 114 between Watson Pkwy and the RR bridge improves from 0.70 to 0.52 from the No-build to the Build cases.
Telecom City (Malden, Medford, Everett)	Telecom City Report on Traffic Impacts and Mitigation Strategies Mystic Valley Development Commission November 1998	Reconstruction of Commercial Street at Medford Street in Malden to include new traffic signal equipment serving four 11-foot lanes plus 4-foot outside shoulders. In the southbound direction, the alignment of the existing reverse s-curve will be flattened. Commercial Street will include a northbound and a southbound lane separated by a median, which will be narrowed at several locations to accommodate a protected southbound left turn lane. A new road connects Corporation Way with Santilli Highway.	This project consists of 5 intersections that examine safety and traffic movement. All of the intersections studied showed no change in LOS grading. Some delay times were reduced with the projected implementation of the alternative suggested, however these were not significant enough to raise the intersection up or down a LOS grade. All data was from 2001.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
Route 126/Route 135 Grade Separation (Framingham)	Route 126 Corridor Study Rizzo Associates, Inc. January 1997 Model Data	Construction of a below-grade underpass (one lane in each direction) on Route 126 beginning on the north at Park Street and on the south near Irving Street. It will pass beneath the MBTA rail crossing and Route 135. Travel lanes will also be maintained at grade at the Route 126/Route 135 intersection with an upgraded signal.	This project examines the major intersection of Rte. 126 and Rte. 135. Existing conditions (1996) showed LOS to be undefinable because v/c ratios and delay times being incalculable. The suggested alternative created calculable delay times showing LOS increasing by at least one grade (E-C) in 2020. The v/c on Rte. 126 north of Rte. 135 improves from 2.07 to 1.36 from the No-Build to the Build cases. The v/c on Rte. 135 west of Rte. 126 stays the same from the No-Build to the Build cases.
Route 140 (Franklin)	Model Data	Route 140 is to be widened from one lane in each direction to two lanes in each direction from I-495 to Garelick Farms. The alignment of Route140 will also be altered to accommodate an improved diamond interchange. The length of Route 140 affected is 1.2 miles.	The v/c on Rte. 140 North of I-495 improves from 1.26 to 0.86 from the No-Build to the Build cases.
Route 53 (Hanover)	Proposed Route 53 Phase 1B Transportation Improvements Project Volume 1 – DEIR March 1998 Model Data	Route 53 is widened from Mill Street to Pond Street from the existing 32-foot cross section to a 66-foot cross section with two lanes in each direction and a center turn lane. A 4-way intersection will be realigned to include Pond Street, Route 53 and Washington Street.	The study looked at three major intersections along Route 53. Existing conditions (1996) showed LOS as E and F grades. The future build alternative (2016) showed an increased LOS by at least one grade at each intersection. Delay times for the existing conditions were too high to be meaningful, however under the alternative, delay times were reduced to 6-7 second delays. The v/c on Rte. 53 between Mill Street and Pond Street improves from 0.86 to 0.41 from the No-build to the Build cases.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
Route 53/228 (Hingham and Norwell)	Model Data	Widen Route 53 in Hingham to a three-lane cross section, to include a center turning lane. Also, widen the approaches at the Route 228 intersection and the High Street/Grove street intersection.	The v/c on Rte. 53/228 near the Norwell town line improves from 0.94 to 0.78 from the No-Build to the Build cases.
Needham Street/Highland Avenue, Newton and Needham	Newton study in progress; information is from staff involvement in project Model Data	Traffic management improvements, including the redesign and reconstruction of Needham Street as a four-lane road or a three-lane road to accommodate through and turning traffic in/out of commercial and other establishments. Project will reduce congestion and delay and improve safety.	Potential reductions in delay. The v/c on Needham Street south of Centre Street improves from 1.63 to 1.29 from the No-build to the Build cases.
Route 128 Transportation Improvement Project, Randolph to Wellesley	FEIR was completed in 1999; various elements are under design and construction	Design and construct a fourth lane and a shoulder on each barrel of Route 128 between Route 9 and Route 24 (13.7 miles). Design and construct a new interchange at Kendrick Street in Needham, including service roads between Kendrick Street and Highland Avenue. Modify several bridges to accommodate the widening of the main line. Project will improve safety and traffic flow along this section of Route 128.	Significant safety, traffic flow, and access improvements.
Bridge Street By-pass (Salem)	Salem-Beverly transportation project: Salem-Beverly Bridge, Bridge Street by-pass, and Bridge Street Reconstruction, Volume 1: Final Supplemental EIR Massachusetts DPW 1989	Construction of a new road along the North River from Veteran's Memorial Bridge to the vicinity of St. Peter Street and Bridge Street.	This study evaluates the creation of a new road. Existing conditions data looked at surrounding intersections only. The preferred alternative's LOS was found to have a grade of C or higher.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
Bridge Street (Salem)	Salem-Beverly transportation project: Salem-Beverly Bridge, Bridge Street by-pass, and Bridge Street Reconstruction, Volume 1: Final Supplemental EIR Massachusetts DPW 1989 Model Data	Widening of Bridge Street from Flint Street to St. Peter Street to two lanes in each direction, including the reconstruction of the Washington Street rotary.	This project considered 5 intersections with Bridge Street. Existing LOS grades for all five intersections was F. Under the new design, all of the five intersections increased their LOS by at least one grade or better (E-B). The v/c on Bridge Street east of Washington Street improves from 1.12 to 0.54 from the No-build to the Build cases.
Route 18 (Weymouth)	Model Data	Widening of Route 18 to two lanes in each direction.	The v/c Rte. 18 south of Rte. 3 improves from 1.45 to 1.21 from the No-build to the Build cases.
Route 3 South Additional Lanes (Weymouth to Duxbury)	Model Data	Widen Route 3 from two lanes in each direction to three lanes in each direction from Weymouth to Duxbury. The project also involves design improvements to the interchange ramps at Route 53 in Hanover, Route 139 in Pembroke, and Route 228 in Rockland.	The v/c improves from 1.46 to 1.27 on Rte. 3 at the Hingham line in Weymouth. The v/c improves from 1.14 to 0.88 on Rte. 3 between Exit 11 and 12 in Duxbury.
Route 1A/Boardman Street Grade Separation	Status as of 1999 reporting by MassHighway Planning and Lower North Shore Transportation Improvements Study, CTPS, 2000	Design and construct an interchange to replace the existing traffic signal at Route 1A/Boardman Street. Project includes the relocation of Boardman Street in East Boston approximately 400 feet of the existing location. Additional design features may include Route 1A widening in the vicinity of the interchange. Project will improve traffic safety and traffic flow at this location.	Overpass will reduce congestion, and will provide for safe and efficient traffic flow through this location.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
Rutherford Avenue (Boston)	Model Data	From City Square to the Tobin Bridge ramps, Rutherford is reduced from 10 lanes to 5 (3 southbound and 2 northbound). From the Tobin ramps to Bunker Hill Community College, southbound traffic is on the surface with intersection at Gilmore Bridge. Northbound traffic is in a one-way neighborhood street separated from the southbound lanes by a landscape buffer. Route 99 underpass remains. Surface intersections in Sullivan Square replace rotary. One lane of Rutherford is eliminated in each direction at Sullivan.	The v/c on Rutherford Avenue near City Square degrades from 0.82 to 1.41 from the No-build to the Build cases.
Route 1A/Chelsea Street Bridge Connection, Chelsea, Boston	Lower North Shore Transportation Improvements Study, CTPS 2000 Model Data	Design and construct a fly-over connection between Route 1A and the new Chelsea Street Bridge. To improve access, especially for trucks, between Route 1A, and Logan Airport, and the new Chelsea Street Bridge. Project will reduce congestion at Day Square in East Boston, which all Chelsea-bound traffic now uses.	Direct access for trucks and other traffic will eliminate circuitous travel, reduce cut-through traffic in Chelsea and East Boston, and improve congestion and safety. The v/c on Rte. 1A at the Chelsea city line improves from 1.62 to 0.88 from the No-build to the Build cases.
I-93/I-95 Interchange, Canton	University Avenue/I-95/I-93 Regional Traffic Study, CTPS, 1999; project to enter environmental stage soon Model Data	New I-95 northbound fly-over ramp New connection between Blue Hill Drive/University Avenue and I-93 southbound A dedicated traffic lane from Route 128 (I-93 southbound) to I-95 northbound. Closure of present Blue Hill Drive on ramp to I-95 southbound. Project will improve safety and traffic operations at this Interchange location.	Significant improvements in safety, especially truck roll-overs. Improvements in congestion and delay due to direct connections and additional capacity. The v/c on I-93 east of I-95 improves from 1.32 to 1.15 from the No-build to the Build cases. The v/c on I-95 south of the I-93 interchange degrades from 1.07 to 1.17 from the No-build to the Build cases.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
I-95 (NB) Dedham Street Off-Ramp	University Avenue/I-95/I-93 Regional Traffic Study, CTPS, 1999 Model Data	Design and construct Dedham Street bridge as four lanes. Design and construct northbound off-ramp. Project will provide direct access to Canton and Westwood's University Avenue industrial area from I-95 northbound.	Eliminates circuitous travel through the town of Canton and Neponset Street interchange just south of Dedham Street by providing direct access from I-95. The v/c on I-95 south of the I-93 interchange degrades from 1.07 to 1.17 from the No-build to the Build cases.
Concord Rotary, Concord	CTPS Traffic Feasibility Study in progress	Grade separation of the Route 2, Route 2A, Barrett Mill Road, and Commonwealth Avenue traffic movements. Project will improve safety and reduce delays at this location	Significant improvement of safety and reduction in congestion.
I-495/I-290/Route 85 Interchange (Marlborough)	Model Data	Interchange improvements at the junction of I-495 and I-290 include the construction of a flyover ramp from I-495 northbound to I-290 westbound and a flyover ramp from I-290 eastbound to I-495 northbound.	The v/c on I-495 north of I-290 stays the same from the No-Build to the Build cases.
Route 1 Improvements, Malden and Revere	Lower North Shore Transportation Improvements Study, CTPS, 2000 Model Data	Reconstruct Route 1 between Route 60 and Route 99 to six lanes per direction; reconstruct the Lynn Street/Salem Street interchange and the Route 1/Route 99 interchange; reconstruct the railroad bridge just south of Lynn/Salem streets. Project will improve safety and traffic operations between Route 60 and Route 99.	Improvement in roadway's capacity to handle the additional traffic diverted to it because of better connections between Route 1A and Route 1. Significant safety improvements at Lynn/Salem streets interchange. The v/c on Rte. 1 north of the Rte. 60 interchange improves from 1.47 to 1.14 from the No-build to the Build cases.
I-93/I-95 interchange improvements, Woburn, Reading	MassHighway/CTPS Feasibility Study in progress Model Data	Reconstruct the interchanges to replace existing substandard loop ramps; eliminate weaving sections within the I-93/I-95 interchange, and between that and the I-95/Mishawan Street interchange. Project will improve safety and traffic operations at the I-93/I-95 and at the I-95/Mishawam Street interchanges	Improved safety and reduced delays at interchange. The v/c on I-93 north of I-95/128 in Woburn and I-93 south of I-95/128 in Stoneham stays the same from the No-build to the Build cases.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
Mahoney Circle, Grade separation, Revere	MassHighway Feasibility Study is complete; DEIR in progress	Grade separation of Route 60 and Route 1A at Mahoney Circle. Project will improve safety and reduce congestion at the intersection of Route 1A with Route 60.	Significant improvement of safety and reduction in congestion
Route 1/Route 16 Interchange, Revere	Lower North Shore Transportation Improvement Study, CTPS, 2000	Construct a large radius on-ramp from Route 16 westbound to Route 1 northbound. Construct an off-ramp, with a traffic signal at its end, for the left turns from Route 1 southbound to Route 16 eastbound. This project will establish a direct connection between Route 16 east and Route 1 north, and a connection between Route 1 and Route 16 east.	Provide for a complete connection between Route 16 and Route 1. Reduce cut-through traffic on local streets.
Route 1A/Route 16 Interchange, Revere	Lower North Shore Transportation Improvement Study, CTPS, 2000 Model Data	Construct a partial cloverleaf interchange serving all movements. One new traffic signal will be installed at Route 16/Revere Beach Parkway providing for left turns between Route 1A southbound and Route 16 eastbound. Project will allow for a seamless, direct connection between Route 1 and Route 1A through Route 16,and improve safety and reduce congestion at Route 1A and Route 16.	Along with the Route 1/Route 16 ramps above, it provides for an improved connection between Route 1 and Route 1A. It reduces congestion in Revere. The v/c on Rte. 16 south of the Rte. 1A interchange stays the same from the No-build to the Build cases.
I-93/Mystic Avenue Interchange, Somerville	Mystic Avenue/Route 28//I-93 Interchange Improvement Study, CTPS, 1994 Model Data	At Route 38, place southbound direction of Route 28 in an underpass thus eliminating the traffic signal at Route 38/Route 28 southbound intersection. Project will improve operations and safety in the area or Route 38/Route 28 and I-93 ramps.	Improvement to traffic operations and delays The v/c on I-93 at the Medford town line stays the same from the No-build to the Build cases.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
I-93/Ballardvale Street Interchange (Wilmington)	I-93/Route 125/Ballardvale Street Interchange Reconstruction & Intersection Improvements, Wilmington, Mass. – FinalEIR/EA MassHighway Department July 2000 Model Data	Reconstruction of the existing ramps at I-93 and the construction of new ramps to I-93 in the northeast and southeast quadrants. Route 125 will also be reconstructed in the vicinity of the interchange and the intersection between Route 125 and Ballardvale Street will be altered.	This study looked at three intersections at I-93/Route 125 and Ballardvale Road. Existing conditions for LOS overall were high on the I-93 ramps (A & B category), yet low for the Ballardvale intersection (F category). This project's alternative design would focus on realignment of all three intersections for increased safety measures and traffic flow, as well as an increased LOS grade to C for the Ballardvale intersection. The v/c on I-93 south of Ballardvale Street stays the same from the No-build to the Build cases.
East/West Connector Road, Canton	Proposed East/West Connector Road, VHB Traffic Study, February 1997	Construct a connector road between Pleasant Street and Turnpike Street (Route 138). Project will eliminate truck traffic from residential streets and direct it to Route 138.	Reduction in truck traffic on residential streets
I-495/South Street New Interchange (Hopkinton)	Model Data	Reconstruction project aligns the I-495 southbound exit with South Street to eliminate the need for EMC-bound vehicles to make a left to cross eastbound South Street traffic.	The v/c on I-495 north of South Street stays the same from the No-build to the Build cases.
Back Bay Turnpike Exit (Boston)	Model Data	Construction of a new slingshot ramp in the Fenway section of Boston that will allow motorists in the Back Bay area of Boston to access the Massachusetts Turnpike eastbound. Currently, motorists in the Back Bay must take local streets through downtown to access South Boston or the tunnels to the airport. This ramp would be in the westbound direction of the Mass Pike at a point just west of Massachusetts Avenue. Traffic would then change directions in a slingshot ramp built above the highway between Charlesgate and Massachusetts Avenue.	The v/c on I-90 in the Back Bay stays the same from the No-build to the Build cases.

Table H-2: Project Level Information for Roadway Projects

Project Name	Source	Description of Improvements	Anticipated Benefits
New Boston Street Bridge (Woburn)	Model Data	Construct a bridge on New Boston Street at the northern end of the Woburn Industrial Park where New Boston Street crosses the MBTA Lowell Branch commuter rail line.	Calculated data shows an extreme jump in v/c data. The assumption is that this new bridge connection will be used as a major travel route that is currently not in use.
Burgin Parkway (Quincy)	Model Data	Build a flyover to separate Burgin Parkway from Centre Street and improve access from Interstate 93 to the Crown Colony Area	The v/c on Burgin Parkway north of Center Street improves from 1.47 to 0.93 from the No-build to the Build cases.
Route 128 Capacity Improvements (Beverly to Peabody)	Model Data	Add one general purpose lane in each direction from Beverly to Peabody.	The v/c on Rte. 128 in Beverly at the Danvers town line improves from 1.15 to 0.95 from the No-build to the Build cases.
Route 128 Capacity Improvements (Lynnfield to Reading)	Model Data	Add one general purpose lane in each direction from Route 28 in Reading to Route 1 in Lynnfield.	The v/c Rte. 128 in Peabody at the Lynnfield town line improves from 1.42 to 1.27 from the No-build to the Build cases.
Rte. 9/Rte. 126 Interchange (Framingham)	Model Data	Improve the existing interchange at Route 9 (Worcester Road) and Route126 (Concord Street). The Route 126 bridge is listed in the Statewide Road and Bridge list and its reconstruction would be a major element of this project.	The v/c on Rte. 9 west of 126 stays the same from the No-build to the Build cases.

Table H-3 Project Level Information for Transit Projects

Project Name	Source	Project Description	Anticipated Benefits				
			Forecast Year	Daily Ridership	New Riders (Auto diversions)	Travel Time Savings (hrs)	VMT reduc tion (Kg)
Arborway Green Line	Ridership forecasts for the Arborway Extn, CTPS study, May 2001.	Restoration of Green Line E branch service from Heath Street to Arborway along S. Hungtington Ave, Center St and South St.	2000	34,850	0	n/a	0
Russia Wharf Terminal	n/a	Construction of a docking facility and passenger shelter at Russia Wharf near South Station. The facility will provide ferry service between South Station and Charleston Navy Yard.		n/a	n/a	n/a	n/a
Silver Line , Phase B	Regional Transportation Plan modeling results, Sept 2001	Construction of a new tunnel from South Station to Boylston Station thorugh Chinatown and connecting the transitway service with Washington Street service.	2025	92,750	n/a	n/a	n/a
New Bedford/ Fall River Extension	Ridership forecasts update for the New Bedford/Fall River Study, CTPS report, August 2000	Extension of the Stoughton commuter rail line through Easton, Taunton and Berkley, then branching into two lines towards Fall River and New Bedford.	2010	4,300	2,950	n/a	198,200
Greenbush Line	Impact of Greenbush Service-CTPS analysis 1996	Extension of the commuter rail line from Braintree to Greenbush in Scituate via stops in Weymouth Landing, Esat Weymouth, West Hingham, Nastasket Junction and North Scituate.	2010	7,800	4,700	n/a	86,160
Medford Hillside Extension	Program for Mass Transportation (PMT), CTPS Report, December 1993	Extension of Green Line service from a relocated Lechmere station to Medford Hillside via new stations at Washington St, School street, Lowell Street and Ball Square.	2020	11,560	3,660	1,160	38,800
Fairmount Line Upgrade	Regional Transportation Plan modeling results, Sept 2001	Upgrade of service on the Fairmont commuter rail line including 15-min headways, extended hours of service, refurbished existing stations and the construction of 5 additional stations.	2025	17,400	n/a	n/a	n/a
Red-Blue Connector	Program for Mass Transportation (PMT), CTPS Report, December 1993	Extension of the Blue Line from Bowdoin Station to Charles Station of the Red Line, providing a transfer between the Red and Blue lines.	2020	19,200	4,970	2,175	30,765
North - South Rail Link	North-South Rail Link Study, CTPS report, December 1996	Construction of a new tunnel from South Station to North Station under the Central Artery alignment and through-routing north and south side commuter lines. There would be one interim station in the vicinity of Aquarium Station. The Rail Link would allow MBTA commuter trains and Amtrak intercity trains to travel from one side of Boston to the other without the need for through passengers to transfer trains.	2020	58850*	21,350	n/a	382,000

Project Name	Source	Project Description	Anticipated Benefits				
			Forecast Year	Daily Ridership	New Riders (Auto diversions)	Travel Time Savings (hrs)	VMT reduc tion (Kg)
Comm. Rail Extn to Marlborough	Commuter Rail extension to Marlborough, CTPS report November 2001	This project involves a 9.5 miles extension of the Framingham commuter rail line to Route I-495 near the Southborough-Marlborough border using the Conrail Fitchburg Secondary Track.		2,730	1,480	287	n/a
Blue Line Extn to Lynn	Program for Mass Transportation (PMT), CTPS Report, December 1993	This project involves extending the Blue Line four miles from its current terminus at Wonderland to Central Square in Lynn. There will be two intermediate stations one in northern Revere and another at West Lynn.	2020	11,340	4,860	893	49,440
Urban Ring Phase I	Ridership Forecasting Urban Ring MIS, CTPS report, August 2001	Urban Ring Phase I includes modifications to existing bus routes, new express bus routes and addition of new crosstown routes.	2025	42,950	6,600	3,590	14,150
Urban Ring Phase II	Ridership Forecasting Urban Ring MIS, CTPS report, August 2001	Phase II includes seven BRTroutes serving imporant activity centers along the Urban Ring corridor. A number of non-redundant crosstown and express bus routes are also included.	2025	106,000	15,000	17,120	52,500
Urban Ring Phase III	Ridership Forecasting Urban Ring MIS, CTPS report, August 2001	In Phase III, a new Urban Ring rail system between the Orange Line at Assembly Sqr and the former Orange Line terminus at Dudley Sqr is added in addition to the service proposed in Phase II.	2025	282,500	46,500	49,185	355,200
New Comm. Rail Stn at Littleton	Ridership and Parking Demand Forecasts for relocated Littleton Station, CTPS memorandum, Sept 1997	The existing commuter rail station will be relocated to a new site off of Route 2 and access to this station will be provided by means of a new interchange between I-495 and Route 2. The new station will have 500 spaces.	2010	200	n/a	n/a	n/a
Planned T parking	n/a	This project involves adding 14,350 new parking spaces at selected MBTA stations where parking shortfalls are projected.	n/a	n/a	n/a	n/a	n/a
Assembly Sqr Orange Line Station	n/a	New Orange Line station located at the edge of the Assembly Sqr development area.	n/a	n/a	n/a	n/a	n/a
LRT on Washington Street	Supplemental ENF, MBTA report 1990	Convert bus rapid transit Silver Line service to light rail from Dudley Square in Roxbury to downtown Boston. There would be five stations along the alignment. LRT vehilces along Washington Street would merge with Green Line service at Boylston and would turn at Park Street or Government Center.	2010	10,350	n/a	n/a	n/a
Comm. Rail Extn to Millis	Commuter Rail Extension to Millis Feasibility Study, CTPS report, March 1998	This project involves a 6.9 mile extension of the Needham Line from Needham Junction to Medfield Junction via the Dover Secondary Track and a 2.2 mile extension to Millis via the Clicquot Secondary Track.		1,360	1,185	n/a	n/a

Project Name	Source	Project Description	Anticipated Benefits				
			Forecast Year	Daily Ridership	New Riders (Auto diversions)	Travel Time Savings (hrs)	VMT reduction (Kg)
Airport/Comm. Rail Connection @ Revere	Ridership Forecasts for the Wonderland Connector Study, CTPS Technical Report, July 1998.	The project involves the relocation of Wonderland station on the Blue Line to the west side of Route 1A. This allows for the construction of a new transfer station for commuter rail service on the Newburyport/Rockport line and the MBTA's Blue Line. Passengers from North Shore would be able to transfer across platform from inbound commuter rail trains to inbound Blue Line service to Logan Airport.	2010	3,700	1,500	n/a	n/a
Additional Buses	Regional Model	Addition of 100 buses on existing routes where current capacity shows a possible need for additional service.	2025	321,300	n/a	n/a	n/a

* increase in commuter rail ridership
x - unchanged

APPENDIX I

Supplemental Information for the
Air Quality Conformity Determination

TABLE I-1
STATUS REPORT OF THE 1979 STATE IMPLEMENTATION PLAN TCMs

Transportation Control Measures In the 1979 SIP	2004 Transp. Plan	Status in 2003
MBTA Plant Improvements - Green Line improvements - station modernization (Park, State, Washington - miscellaneous plant improvements	 X	 implemented and ongoing completed - other stations now being modernized (Blue Line) implemented and ongoing
MBTA Vehicle Fleet Improvements	X	implemented and ongoing
Commuter Rail Improvement Program	X	implemented and ongoing
MBTA Park 'n' Ride Program - Alewife, Quincy Adams, & Braintree - Forest Hills -Mishawam	 X X X	 complete complete complete
Reduction and Relocation of bus stops	X	implemented and ongoing
Urban Systems (TOPICS-type) Program	X	implemented and ongoing
Off-Street Parking Freeze - City of Boston		implemented and ongoing
Off-Street Parking Freeze - City of Cambridge		implemented and ongoing
Off-Street Parking Freeze - Logan Airport		implemented and ongoing
Public Information/Promotion - bus stop sign replacement - information kiosks		 implemented and ongoing implemented and ongoing
Commuter Boat Service Demonstration (Hingham to Boston)	X	regular contract service ongoing
Red Line Extension from Quincy to Braintree	X	completed & opened for service in 1980
Red Line Extension from Harvard to Alewife	X	completed & opened for service in 1985
Orange Line Extension from South Cove to Forest Hills	X	completed & opened for service in 1987
Downtown Crossing Pedestrian Zone		implemented & ongoing
Boston Resident Parking Sticker Program		implemented & ongoing
Cambridge Resident Parking Sticker Program		implemented and ongoing
MDC On-Street Parking Ban		ongoing
MBTA Pass Program		implemented and ongoing
Masspool, Inc. (CARAVAN)	X	ongoing
Extension of I-93 HOV Lane to Charlestown	X	complete
MBTA Suburban Bus Program	X	ongoing
State/Local Financing Net Cost of T-Service - review of fare changes shall involve the public and consider environmental impacts		ongoing

TABLE I-1 (cont.)
STATUS REPORT OF THE 1979 STATE IMPLEMENTATION PLAN TCMs

Transportation Control Measures In the 1979 SIP	2004 Transp. Plan	Status in 2003
Bicycle Racks at transit stations		ongoing
MDPW (MHD) Bikeway Program		ongoing
Variable Work Hours Program		ongoing
MBTA Idling Reduction Program		implemented and ongoing
Right-Turn on Red		implemented and ongoing
Charlestown Bus Garage		completed 1979
Bus Immersion Heater Program		discontinued, new bus purchases subject to increasingly stringent emission standards
Improved Service Delivery - priority signals, automated fare collection, scheduling and routing modifications, & passenger shelters	X	implemented and ongoing
Improved Service Evaluation		ongoing

TABLE I-2
STATUS REPORT OF THE 1982 STATE IMPLEMENTATION PLAN TCMs

Transportation Control Measures In the 1982 SIP	**2004 Transp. Plan**	**Status in 2003**
Improved Public Transit - Downtown Private Bus Parking - Insurance Discounts for Private Bus Riders - Improved Logan Bus Service - Newton Rider Bus Service - Vehicle Replacement & Modernization		- ongoing - discounts for MBTA pass holders - ongoing - discontinued, substituted with MBTA service - completed & ongoing
Area-Wide Ridesharing Programs	X	ongoing
On-Street Parking Controls - Resident Parking Sticker Programs - Boston Tow and Hold Program - Cambridge Zoning Ordinance Change		ongoing
Pedestrian Malls - Auto Restriction Zones		ongoing in Salem, discontinued in other cities; substituted with other program.
Employer-Based Ridesharing Programs - Airport Ridesharing Program		ongoing
Road Pricing to Discourage Single-Occupant Vehicles - Mass Pike, Callahan/Sumner Carpool Incentive Program		ongoing
Interstate 93 Southbound HOV Lane	X	implemented, ongoing
Traffic Flow Improvements - Urban Systems Projects	X	ongoing
Fringe Parking/Park and Ride Lots	X	ongoing
Long -Range Public Transit Improvements - Private Carrier Bus Leasing Program		ongoing
Bicycle Facilities - Long distance bike facilities - Bicycle travel on the MBTA - Bicycle Storage Facilities		- implemented - ongoing - installed at South Acton Commuter Rail Station

TABLE I-3
STATUS REPORT OF THE CENTRAL ARTERY
STATE IMPLEMENTATION PLAN TCMs

Central Artery Mitigation Construction Projects	2004 Transp. Plan	Status in 2003
South Station Bus Terminal	X	Opened for operations on October 28, 1995
South Station Track #12	X	Operating, effective Dec. 20, 1995
Ipswich Commuter Rail extension to Newburyport	X	Revenue service began October 1998
Old Colony Commuter Rail Extension	X	Full weekday service implemented Plymouth and Middleborough Lines in December 1997. Greeenbush included in ACO, substitution submitted to DEP.
Framingham Commuter Rail Extension to Worcester	X	Interim service started in September, 1995
20,000 new park and ride and commuter rail station parking spaces	X	Completed – 2001
Blue Line Platform lengthening and modernization	X	Five stations have been modified for 6 car trains. Work continues on downtown stations. Consent order establishes a new deadline of 12-31-04. The MBTA notified DEP that it will be completed in 2005.
Green Line Arborway Restoration	X	Infeasibility study not accepted by DEP. MBTA going forward with construction of project.
South Boston Piers Electric Bus Service	X	Petition for delay until 12/31/03 accepted by DEP.
Green Line Extension to Medford Hillside (Tufts)	X	Scheduled completion 2011
Blue Line Connection from Bowdoin Station to Red Line at Charles Station	X	Scheduled completion 2011
Silver Line (Washington Street Replacements)	X	Bus rapid transit with 40 foot CNG buses operating. Service with 60 Foot CNG buses by September 2003.
Alternative Fuel Buses	X	MBTA has advertised a procurement for 418 alternative fuel vehicles, all of which have purchase orders.
South Boston Parking Freeze		Regulation adopted in 1993, inventory and plan is pending with DEP.

TABLE I-3 (cont.)
STATUS REPORT OF THE CENTRAL ARTERY
STATE IMPLEMENTATION PLAN TCMs

Central Artery Mitigation Study Projects	2004 Transp. Plan	Status in 2003
I-93 Southbound HOV Lane to Mystic Avenue	X	Completed
I-93 HOV Lane from Mystic Avenue to Route 128		Further study required
I-93 (SE Expressway) HOV Lane from I-90 to Route 3	X	Opened November, 1995
Development of issues to be addressed in the Program for Mass Transportation	X	PMT adopted 1994, new PMT adopted May 2003
Toll Pricing feasibility to Logan Airport		in progress
Feasibility of toll booth on Route 1A		completed June, 1994
Feasibility of water shuttle between Boston and North Shore	X	completed 1991
Transit improvements study - PMT	X	New PMT adopted May 2003
Feasibility of rail connection between South Station and Logan Airport		final report issued July, 1994
Expansion of size and number of Logan Express service parking and transit facilities	X	completed June, 1994
Expanding high occupancy vehicle lanes and services within Logan Airport	X	completed June, 1994
Connecting circumferential transit facilities and radial transit services	X	interim cross-town service started September, 1994; Urban Ring Study underway
Upgrade rail service to NY; Worcester & Springfield, MA.; Hartford, CT.; and Portland, ME.	X	in progress
Examine indexing of transit fares	X	ongoing, indexing issue discussed as part of annual fare review.
Feasibility of HOV Lanes on I-90 between I-93 and I-95	X	completed 1994
Urban Ring	X	ENF and MIS submitted July 2001. MEPA certificate issued October 2001. Draft EIR by December 2003.

An Administrative Consent Order (ACO) was signed by EOTC and the Executive Office of Environmental Affairs (EOEA) on September 1, 2000. The ACO reconciles and adjusts dates of completion for all projects required as mitigation for the Central Artery that have not been completed to date. This conformity determination includes all projects that are part of the ACO.

TABLE I-4
CATEGORICALLY EXEMPT PROJECTS

Certain transportation projects eligible for federal funding have no impact on regional emissions. These are 'neutral' projects that, because of their nature, will not affect the outcome of regional emissions analyses and add no substance to those analyses. As a result, DOT and EPA have agreed that such projects may be excluded from the regional emissions analyses required in order to determine conformity of TIPs and Plans. Projects eligible for this treatment are as follows:

<u>Safety</u>

Railroad/highway crossing
Pavement marking demonstration
Hazard elimination program
Safer off-system roads (non-federal-aid system)
Emergency relief (23 U.S.C. 125)
Also specific projects for:
- intersection channelization projects
- shoulder improvements
- truck size and weight inspection stations
- safety improvement program
- intersection signalization projects
- railroad/highway crossing warning devices
- changes in vertical and horizontal alignment
- increasing sight distance
- guardrails, median barriers, crash cushions
- pavement resurfacing and/or rehabilitation
- widening narrow pavements or reconstructing bridges (less than one travel lane)
- noise attenuation
- fencing
- skid treatments
- safety roadside rest areas
- other traffic control devices
- truck climbing lanes
- lighting improvements
- adding medians

TABLE I-4
CATEGORICALLY EXEMPT PROJECTS
(continued)

Mass Transit

Purchase of office, shop, and operating equipment for existing facilities
Purchase of operating equipment for vehicles (e.g. radios, fareboxes, lifts, etc.)
Construction or renovation of power, signal, and communications systems
Operating assistance
Rehabilitation of transit vehicles
Reconstruction or renovation of transit buildings and structures (e.g. rail or bus buildings, storage and maintenance facilities, stations, terminals, and ancillary structures)
Construction of small passenger shelters and information kiosks
Rehabilitation or reconstruction of track structures, track, and trackbed in existing rights-of-way
Noise attenuation
Purchase of support vehicles (e.g. autos, vans)
Purchase of new buses and rail cars to replace existing vehicles or for minor expansion of the fleet to provide new service
Construction of new bus and rail storage and maintenance facilities which meet the conditions for categorical exclusion specified in 23 CFR 771

Air Quality

Continuation of ride-sharing and van-pooling promotion activities at current levels
Bicycle projects
Pedestrian facilities

Other

Engineering to define elements of proposed action or alternatives to assess social, economic, and environmental effects
Advance land acquisitions as prescribed in 23 CFR 771
Acquisition of scenic easements
Plantings, landscaping, etc.
Sign Removal

APPENDIX J

Public Comments

Public Comments will be included following the 30-day public comment period.